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DISCOVERY OF THE COURSE OF THE CONGO.

AFRICAN discovery is a subject which has had a deep and abiding interest for Englishmen during upwards of a century; mainly as it would seem on account of the extraordinary difficulties in the way, and of the vastness and supposed richness of the unknown region. To discover the sources of the Nile, the Niger, and the Congo is a task, or rather series of tasks, which has fascinated and interested at least five generations, and has aroused the ambition and called forth the adventurous spirit of a small army of gallant explorers. It was in 1788 that a company of noblemen and men of science formed themselves into an association, with the object of promoting African discovery, and, thanks to their exertions during nearly half a century, most wonderful progress was made. The African Association was the precursor and direct ancestor of the Royal Geographical Society, which has since continued the work, until now there is but one great secret to be disclosed, one hard achievement of the first rank to be done. The whole story of the Nile and its tributaries, which has so long been a subject of discussion, will probably soon be disclosed by Colonel Gordon and his staff. The origin and course of the Niger have also been discovered, and there is an increasing trade on its waters. But a great stream, inferior neither to the Nile or the Niger, flowing through a vast region, of which absolutely nothing is known, remains undiscovered. The exploration of the Congo, the mightiest of the rivers of Africa, is now the most worthy object of an African explorer, and he who succeeds in laying open the hidden secrets of that famous stream will rank second to none in the glorious roll of English travellers. The difficulties however of ascending it from the western side have hitherto proved so great that it is more probable that the first thorough exploration will be made from the eastern side. Our readers are aware that at this present moment Lieutenant Cameron is striving to accomplish this feat, which if it should please Providence to allow him to carry through to its completion, will probably rank as the grandest geographical exploit achieved during the present century.

In anticipation of this brave explorer's return amongst us, the present appears a not inappropriate time to take stock of all that has been done, and of all that is known, touching the mouth and the lower course of the Congo; and this takes us back to the stories of Portuguese discovery nearly four hundred years ago. The little hero nation has the undisputed glory of having, by dint of steady perseverance and dogged resolution, explored the whole west coast of Africa and first doubled the Cape of Good Hope. The great merit of the Portuguese is that their efforts were continuous, that the whole grand achievement was not done by one stroke of luck, but that it was built up, as it were, through the labours of many men, all working at one design, advancing step by step, with an intelligible aim which had been carefully thought out before-hand, by their great architect, Prince Henry, who, it should always be remembered, was himself half a Plantagenet. In the erection of a grand edifice of geographical discovery, the Portuguese had a regular working plan, and visible marks whereby progress was measured and recorded. These marks were designed by King João, and consisted of stone pillars, surmounted by a cross, with the royal arms of Portugal sculptured in front, the name of the king and of the discoverer, and the date at the sides. They were called *Padrãos*, and one of them marked the discovery of the Congo.

It was taken out from Lisbon, in the year 1484, by a Knight of the King's household named Diego Cam, who passed Cape St. Catherine, the most southern point hitherto reached, and came to the mouth of a great river, on the southern side of which he set up the pillar. Hence the river was named the Rio do Padrão. The natives called it, at its mouth, the Zaire, and it is known to us as the Congo, from forming the northern boundary of that kingdom. Diego Cam ascended the river for a short distance, had very friendly intercourse with the people, and took home four natives, leaving the same number of Portuguese with the King of Congo, as hostages for their return. The kindly relations between the Portuguese and the people of Congo continued for a long time. Diego Cam returned in the following year, with his native friends, and in 1489 Gonzalo Sousa took out a regular embassy, proceeding from the great river to Banza Congo (San Salvador) the residence of the king, who received baptism and built a church. There was a long succession of kings of Congo with Portuguese names, many embassies passed to fro and between Lisbon and the Banza, and San Salvador became a flourishing city, with a native Christian king, a bishop, and many monks, and a considerable trade. The provinces of the kingdom were demarcated, and their chiefs received the titles of dukes, marquises, and counts. But there is no record of any advance into the

interior, beyond the territory subject to the native king at San Salvador.

After the lapse of a century from the discovery by Diego Cam, we come to the residence in the country of Congo of Duarte Lopez, from 1578 to 1587, whose history of Congo was published in Rome in 1591 by Pigafetta, with maps. Lopez gives the territory an extension of 600 miles inland, which is far beyond the limits of what we now have any geographical knowledge of. But the king, in those days, had a title indicating vast possessions. He was called Dom Alvaro, King of Congo and of Abandos, and of Matama, and of Quizama, and of Angola, and Lord of the river Zaire and of Loango. Lopez tells us, also, of two lakes in the far interior, called Zembre and Aquelunda, from which the great river and its tributaries flow; and it seems likely that intercourse extended farther into the interior in those days, and that geographical knowledge of the unexplored portions was more complete then than is the case now.

An Englishman, the first of our Congo explorers, was in the country in the days of Duarte Lopez, and told his tale to old Samuel Purchas. His name was Andrew Battell, and he afterwards became the near neighbour of the author of the *Pilgrimes*, dwelling at Leigh in Essex. Here he recounted the adventures of his early life, how he served under the Portuguese Governor at St. Paul de Loanda, how he marched far into the interior, how he saw a crocodile swallow eight slaves fastened to a chain, and other marvels. From Duarte Lopez and Andrew Battell our ancestors first heard of the wondrous Congo or Zaire. It was truly reported to be of such force that no ship could get in against the current but near the shore; and to prevail against the ocean's saltness threescore miles within the sea, "before the Congo's proud waves yield their full homage, and receive that salt temper, in token of subjection." "Such," exclaims old Purchas, "is the haughty spirit of that stream, which overrunning the low countries as it passeth, and swollen with conceit of daily conquests and daily supplies, which in armies of showers are by the clouds sent to his succour, runs now in a furious rage, thinking even to swallow the ocean, which before he never saw, with his mouth wide gaping, eight and twenty miles, as Lopez affirmeth. But, meeting with a more giant-like enemy, lies lurking under the cliffs to receive his assault, he is swallowed up, yet still foaming with disdain, and filling the air with noise."

Purchas uses quaint language, but his description of the volume of the Congo and of the effects of its discharge is perfectly correct.

Nearly a century after the days of Duarte Lopez and Andrew Battell, we have another historian of the Congo, in the person of a Capuchin Friar, named Giovanni Antonio Cavazzi, who was many years in the country, suffered great hardships, and submitted an elaborate report at Rome in 1668. He tells us of two tributaries of the Congo, namely, the Vambra, rising in the mountains which divide Fungono from Mæno-emugi, the Quango, and the Berbela, which flows through Lake Aquelunda. Cavazzi also describes Banza Congo, or San Salvador, 50 leagues from the sea, as being fortified, having a dozen churches, and a Jesuit's college, a spacious palace for the native kings, a Portuguese town a mile in circuit, and a population of 50,000 souls.

We may gather from these earlier accounts of the Congo that the Portuguese obtained paramount influence for a distance varying from 200 to 300 miles from the sea, that they collected much information respecting the lakes and the courses of the rivers in the far interior; but that the course of the great river was entirely unknown beyond the Falls, and that no European explorer had penetrated far beyond the territory of the native king, whose capital was at Banza Congo. The ideas formed by the Portuguese are shown on the map drawn by Lopez in 1587, which has been reproduced by Mr. Major in his *Life of Prince Henry the Navigator*. He gives the Lake Zembre, agreeing with Tanganyika, whence flows the River Congo, and further west the lake of Aquelunda, which also feeds the Congo. Then there are two lakes on the equator, "the Lake of the Nile," and Lake Colne, agreeing with the Albert and Victoria Nyanzas. In looking at these features of the map of Lopez it is impossible to avoid the conclusion that the information on which it was based, though often misunderstood, was in the main correct, and yet this information was entirely neglected, and was never repeated on subsequent maps until the discoveries of Burton, Speke, and Baker, restored the three lakes to nearly the positions given to them by Duarte Lopez in 1587. Lopez was also the first to insert the country of Monomvezi (or Unyamwezi) between his lake Zembre (Tanganyika) and the east coast, and he also shows the lake Dembea or Tsona of Abyssinia.

When the African Association was founded, and England began to take the place of Portugal as the fatherland of discoverers, the knowledge acquired by Duarte Lopez and Cavazzi was forgotten or unheeded; and ideas respecting African geography were more confused than they had been two centuries before. Rennel had shown, from the difference of levels, that the Niger did not flow into the Nile, Mungo Park had suggested that the Congo was the mouth of the Niger, and a German geographer, named Reichard, had, with more sagacity, made the Niger pour its waters into the Gulf of Benin. There was nothing but conjecture and hypothesis, but at the same time there was a strong feeling in favour of geographical research, in which the Government took the lead, guided by that great man Sir John Barrow, the steady and enlightened promoter of African, as he was of Arctic exploration.

As soon as the war with France was over, Sir John Barrow induced the Admiralty to despatch a naval expedition to explore the Congo. The undertaking was originally grounded on the idea that the Niger and the Congo were identical; but it was thought on general grounds that a river of such magnitude as the Zaire or Congo ought to be examined, and that it was incompatible with the then state of advancement in geographical science that it should be unknown except for a distance of 200 miles from its mouth. If such was the feeling sixty years ago, how much stronger ought it to be now!

Captain Tuckey, an officer who had done good service during the war, but who had lingered for years in a French prison, and whose constitution had been undermined by service in the Red Sea, was selected to command the Congo Expedition. He was instructed that, as the constant flood led to the supposition that one branch of the great river came

from the tropical region north of the equator, he should, in exploring, give the preference to that stream. He was told that another branch probably came from the east, and that a third, rising in a lake called Aquelunda, of which many details are given by early missionaries, flowed from the south and was the least interesting.

Captain Tuckey received command of a steamer called the 'Congo,' with a crew of forty-nine officers and men, including a botanist and zoologist. The expedition reached the mouth of the Congo on July the 5th, 1816, and proceeded up the river in boats to the foot of the Falls of Yellala, the furthest point hitherto reached.

Captain Tuckey found that the importance of the Congo or Zaire, the real name of which he reported to be "Moienzi Enzaddi" (the river that absorbs all others), had not been exaggerated. The mouth, about six degrees south of the equator, has a breadth of 6 miles and a depth in mid-channel of 150 fathoms. Its great volume and the force of its current effectually prevent the formation of a bar. Many miles out at sea, as old Purchas truly says, the water is perfectly fresh and of a dingy red colour. At a distance of 102 miles above its mouth, the river has a depth of 50 fathoms, and at 140 miles the Yellala Falls commence. Unfortunately Tuckey's expedition did not reach the Congo until the best time for travelling, from May to July, was over. The captain himself, accompanied by fifteen of his party and two interpreters from Embomma, where the 'Congo' had been anchored, landed on the north shore on the 14th of August, and came in view of the Falls, where the river was narrowed to a comparative brook, bubbling over a rocky bed, with an island breaking it into two channels. After travelling for about forty miles over a hilly country, the little party reached a place called Inga, near the head of the Falls, and on the 24th they were on the banks of the upper river, where it was 300 yards wide. On the 6th of September they obtained canoes to hold eight people, where the river becomes 4 or 5 miles wide and free from all rocks. The country was barren and bare of trees, but with a few fertile spots; and the hills rose gently from the banks. The river was rising, and the total rise and fall, as marked by the rocks, was 11 feet.

This was their furthest point, about 280 miles from the sea, which they reached on the 9th of September. A glorious prospect was before them—the navigation of a gigantic stream, unobstructed by rocks, and leading them to a great and important discovery But sickness obliged them to retrace their steps, and death overtaking Captain Tuckey and others, the expedition returned in command of the master, Mr. Fitzmaurice, who executed the survey from the foot of the Falls to Embomma.

No one has since ascended the Falls of the Congo, or again reached the point on that river which Tuckey attained in 1816.

But some remarkable journeys have since been made from the Portuguese settlements on the west coast to some of the rivers which are believed to join the Congo from the south, and between the meridians of 15° and 25° E. In 1802 there were two merchants, of native origin, called Pombeiros, who, starting from Angola, traversed the kingdom of Muata Yanvo (Kabebe), crossing many rivers, visited the Cazembe's capital, and reached the Portuguese station of Tete on the Zambesi. Between 1843 and 1848, a Portuguese traveller named Graça, followed in the track of the Pombeiros nearly to Kabebe, and in 1849 Ladislaus Magyar, a Hungarian officer, explored part of the course of the Kasabi or Loeki, reaching a place called Ya-quilem, beyond Kabebe, and hearing of a great lake to the north, the Uhanya, probably the same as the reedy lake heard of by Dr. Livingstone, through which the Lualaba flows. Dr. Livingstone, during his memorable journey from St. Paul de Loanda to the mouth of the Zambezi, also crossed some of the feeders of the Kasabi, which he reported as draining a vast area of slave-producing country.

From its mouth to the foot of the Yellala Falls, the river Congo has very frequently been visited. The last expedition, starting from the west coast, was that of Lieutenant Grandy, who was sent out at the sole cost of Mr. Young, of Kelly, to ascend the Congo with supplies, on the chance of Dr. Livingstone adopting that route, and being in need of succour.

An account of this expedition has, however, so recently been given in our columns,* that we will not repeat it. It failed to add materially to our geographical knowledge, but Lieutenant Grandy, nevertheless, deserved great credit, for all he had done had been well and judiciously done. He showed tact and ability as a traveller, combined with resolution and perseverance; and he was just entering upon work of the greatest importance, near the point where Captain Tuckey was obliged to fall back—above all, he was proceeding in a direction which would have brought help to Lieutenant Cameron long before that gallant officer can reach any European settlement; and the two explorers fully expected to meet and mutually assist each other when they left this country.

Lieutenant Grandy has, however, established the best route for a Congo expedition, and the true method of equipment. He calculates the cost of a thoroughly equipped expedition, which would command success by being independent of local carriers, at 4000*l*. But the results would be worth that sum over and over again, by opening to European trade the riches of a country abounding in ivory, copper, and other valuable products. The rainy season is over in the Congo by the 15th of May, and an expedition should have ascended the river to the point of departure at that date. The whole of the outfit should be prepared in this country, and made up in compressed water-tight bales not exceeding 60 lbs. in weight, including cloth and wire for trading; and the porters should all be engaged at Sierra Leone. Grandy's great difficulty was the incessant desertion of native porters. The best route would be up the river to Lucango, and thence by land to San Salvador, for near the banks of the river the country is difficult, and is moreover a perfect nest of chiefs who, being very keen traders, would raise all manner of difficulties, and require very expensive presents. From San Salvador to the north-east the country is more open, travelling easy, and as there would be no difficulties about carriers, the expedition would make rapid progress. The route would be by way of Makouta to Sundi near the Congo River, and a considerable distance above the point reached by Tuckey.

* See our January number, p. 26.

The cost of the expedition would be 900*l.* for goods, 400*l.* for arms and ammunition, 224*l.* for a pontoon raft, 320*l.* for passages and outfits of two Europeans, 650*l.* for passages of 60 carriers, a head-man and interpreter from Sierra Leone to the Congo, and 1507*l.* for their wages; the total cost of the expedition being 4000*l.*

It is right to give these details, as a Congo Expedition ought to be despatched from this country to meet and succour Lieutenant Cameron, and to secure the full results of his labours; and because the only chance of such a step being taken is through the idea being adopted and carried into execution by private enterprise. There is no Sir John Barrow alive now to coerce the Admiralty into such an undertaking. It must be done by the Chambers of Commerce, and by merchants who are the successors of the promoters of such expeditions in former days, and whose names will live in history for ever. Such an expedition will not only be one of succour, but it will also aid in the discovery of a vast region, which is known to abound in copper and ivory, and many other valuable products. To mention one: the *Adansonia gigantea* or baobab tree. The fibre of its bark yields material for the best paper that can be made; but it is not used owing to the uncertainty of the supply. Manufacturers will not introduce a new product unless the continuance of an adequate supply is well assured, and for obvious reasons. If a demand arose now, there would at once be reckless destruction and consequent failure of supply. But if the trees were properly treated on correct forest principles, the supply would be inexhaustible as well as the demand, for there is a great and increasing need for materials for paper-making. There would be the same results as regards many other products; and with a great navigable river, and easy land routes, such as are described by Lieutenant Grandy, an immense trade would arise throughout the vast region of the Congo Valley.

Another result of a Congo expedition, and of the opening of this region to European commercial enterprise, would be the final limitation of the slave trade. If English explorers, leading the way for English trade, advance from the west coast, they will sooner or later meet the Arab slave-traders, making their way inland from the east coast. At that point the operations of the latter must cease for ever; and thence they will have to recede.

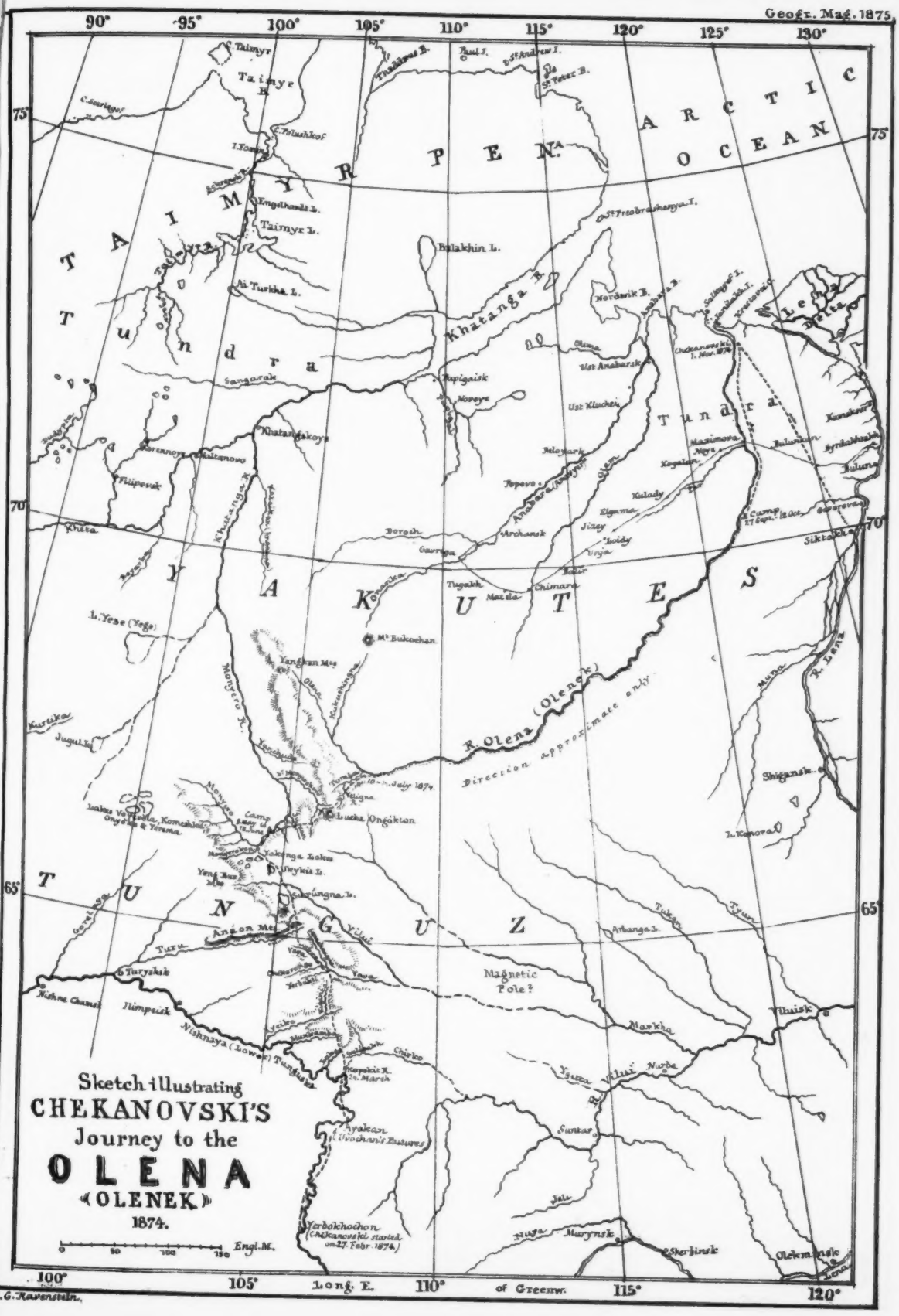
There are then three great and sufficient motives for the despatch of another Congo expedition, the relief and succour of Lieutenant Cameron, who is advancing single-handed, from the east coast; the opening to European commerce of a vast unknown region abounding in rich capabilities; and the final limitation of the operations of the slave trade. This last object will be effected by opening up the Congo to European legitimate trade; and if Cameron should succeed in making an opening for this by connecting Livingstone's furthest point at Nyangwe on the Lualaba, with Tuckey's furthest on the Congo, he will have paved the way for measures of greater efficacy towards crushing the slave trade than any amount of treaties or cruisers.

CLEMENTS R. MARKHAM.

THE OLENA EXPEDITION, 1873—74.*

CHEKANOVSKI and MÜLLER left Irkutsk towards the close of 1873 with a view of penetrating to the sources of the Olena River, and thence to the shores of the Arctic Ocean. They spent a month and a half in making preparations for this extended journey, such as the engagement of servants, the purchase of provisions and stores, and the training of reindeer, and started on the 27th of February from Yerbokhochon, a place on the Lower Tunguska, in latitude 61° 15′ N. They travelled in reindeer-sledges, and owing to the deep snow, made but little progress, being obliged to rest frequently in order to recruit the strength of their men and animals, and to repair the unavoidable damage sustained by the sledges. At first they followed the valley of the Nishnáya or Lower Tunguska, only leaving the banks of the river in order to cut off its great windings. On the 24th of March the expedition reached the mouth of the Kopokit (latitude 63° 12′), which it ascended to its source, crossed the head-stream of the Gúlosakh (a tributary of the Chirko) and the Lyuken (a tributary of the Tunguska), and on the 31st of March the Munkamba, and subsequently a narrow mountain-ridge, and rested, on the 3rd of April, at the confluence of Kiginta and Iyeiko (latitude 64° N.). The road up the Kiginta was most troublesome, owing to the great volume of icy water and the large number of springs. Having crossed the waterparting between the Nishnaya Tunguska and the Vilui, Chekanovski entered the valley of the Vava. The general direction, thus far, had been N.W., it became now W.N.W. Two tributaries of the Vava were crossed—the Yerbukli and Chekorongo, after which the road was crossed to the left bank, in order to cut off a large bend of the river, where it is joined by the Senachángna, one of its most important tributaries. On Easter Day the expedition rested below the junction of the head-streams of the Vava, in latitude 64° 46′, and on the 18th of April it crossed the waterparting of that river, as well as the Turu, the last affluent of the Nishnaya Tunguska in that direction. On the following day the Anáon Mountains were reached. They rise steeply on the right bank of the Turu, and were crossed on the ice of a small lake which occupies a depression surrounded by precipitous cliffs. On the 21st Chekanovski reached Lake Surúngna, where he found numerous traces of natives, such as store-houses, fishing-tackle, the bark of trees, the sap-wood of which is eaten by the natives, &c., but no inhabitants made their appearance. The road thence led towards the W.N.W., in the direction of the Yakongna Lake, where natives were reported to reside throughout the year. The Vilui was crossed at a place where it is 177 feet wide, but then it became necessary to rest three days, for the guide and several of the men were suffering from inflamed eyes, caused by the glare of the snow. Very soon afterwards a further

* Annual Report of the Russian Geographical Society fo 1874, and Istvestya X., part 2, and XI. part 2. M. Albi Kohn thus writes with reference to Chekanovski in the *Globus* (vol. xxvii.):—"I first made his acquaintance at Alexandrovsk, near Irkutsk, where, like myself, he led the life of a convict. He is a man of high scientific attainments. When 'interned' on Lake Baikal he devoted his time to study and made valuable collections. These latter were lost during the unfortunate revolt of the Polish convicts, in which Chekanovski took no part, and which he was unable to prevent." The dates in this paper are according to the new style.


Sketch illustrating
CHEKANOVSKI'S
Journey to the
OLENA
(OLENEK)
1874.
Engl. M.
Direction approximate only
Magnetic Pole?
Long. E. of Greenw.
E.G. Ravenstein.

rest of four days became necessary on Lake Ukükit (latitude 65° 57′), partly in order to await the passing over of a snow-storm, partly to await the return of the men who had been despatched in all directions in search of natives. On the 2nd of May the expedition at length reached the Yakongna Lakes, the eastern and north-eastern shores of which were skirted.

The Governor-General of Eastern Siberia had instructed the Director of the Vilui District to facilitate the progress of the expedition, and Chekanovski therefore expected that the natives would have been informed of his approach, but found that nothing had been done. On the 21st and 22nd he again sent messengers in all directions, but they returned without success. They frequently found traces of inhabitants, such as sledge-tracks and "Balagans," that is, huts having windows fitted with sheets of ice, a sure sign that the inhabitants spend the cold season here. The next task of the expedition consisted in the search for the Olena. Chekanovski entrusted this task to Golye Kaplin, one of his Tunguzians, who had attended the meeting of his fellow countrymen which was held during the preceding year, at the confluence of Ilimpei and Nishnaya Tunguska, on which occasion he had become acquainted with the Tunguzians from the Surungna Lake, and had collected information respecting the Yakongna Lakes and the Olena. This scout returned after twenty-four hours' absence, and conducted the expedition in a northerly direction over some low hills, when the Monyero, a river 280 feet wide, was reached. This river was traced until it joined a larger one coming from the S.S.W., and having descended the latter during two days, the expedition encamped for the spring in latitude 66° 26½′ N., in the firm belief that they had reached the Olena (Olenska).

The guides were not bound to proceed any further, and as no natives had been met with, the success of the expedition would have been endangered if they had not agreed to accompany the expedition to the north, and to remain at the spring camp until the journey should be continued. This willingness alone enabled Chekanovski to continue his explorations, which he could not have done without reindeer or without men to assist him in building a boat to navigate the Olena. These two guides, Peter Golye Kaplin and Peter Uvochan Kaplin, were subsequently rewarded by the Russian Geographical Society by having gala kaftans presented to them. They had supplied the expedition with eighty reindeer besides spare animals, had charge of the whole of the baggage, and furnished the necessary labourers. The expedition thus numbered 2 Russians, (Chekanovski and Müller), 1 Cossack, 15 labourers, and 150 reindeer. If the unavoidable delays at the lakes had not taken place, Chekanovski might have been able to push much further north, which would have been more interesting than his stay at the Monyero, but the reindeer began to calve early on the 28th of April, and this rendered all further progress impossible for the present.

Chekanovski here built a boat, and awaited the breaking up of the ice. On the 18th of June he began his voyage down the river, which was rendered difficult on account of numerous cataracts, but had hardly proceeded 10 versts when he met an old Tunguzian, who informed him that he was navigating the Monyero, a tributary of the Khatanga, and that the Olena was to be looked for further towards the north-east. This was disheartening news, but the direction of the march was nevertheless changed cheerfully. Two hours' persuasion had to be expended before the old Tunguzian consented to act as guide to the Olena. This Tunguzian was more than ninety years of age, and his reluctance is thus readily explained. He furnished Chekanovski with a considerable amount of geographical information on a district hitherto hardly known at all. He said that the Monyero rose to the north-west of the camp, flowed in a S.W. direction at first, and was joined by the Monyerokan in the vicinity of the Yakongna Lake. It then turned towards the N.W. and finally joined the Kotui. The latter flowed at first not far from the Yenisei, and the springs of the Kapchuk and Num. In its lower course it received tributaries from the Lakes Jugul and Ege (Yese, Shesei) on the left, and from the lakes Voyevoli, Komeshka, Onyoko, and Erema from the right. To the east of the latter there was a mountain range, which separated the lakes from the Upper Monyero, and extended south as far as the Yakongna Lake. Several small tributaries of the Monyero, all of which rejoiced in the name Monyerokon, had their sources in it. Below the camp the Monyero received two larger tributaries, both from the right, viz., the Lower (Nishnüi) Monyerokon and the Yanchude. The latter rose in the mountains separating Monyero and Olena. These mountains were generally of small height, though they rose above the limit of trees. The highest summits were the Lucha Ongókton, at the junction of the river-basins of Nishnüi Monyerokon, Vilui and Olena, and the Boldono, towards the north-west, the highest of all, in which rose the Yanchude. The Yangkan was still further in that direction, on the Lower Monyero, and gave rise to the Olena. The latter is formed by two head streams, viz., the Kukushingna, which rises in the Bukochan Mountains (which also give rise to the Onamka, the most important head-stream of the Anavyer or Anabara) and the Olena Proper, which originates in the Yangkan Mountain.

On the 23rd of June the pack saddles of the reindeer had been arranged, and the expedition started in a north-easterly direction, up an unnamed small tributary of the Monyero, and crossed a mountain saddle into the Jukan Valley. It then crossed the Lucha Ongokton. The summit of these mountains consisted of trap overlying marls, and was not covered with snow. One of the Monyerokans rises here, and not far from it the Veligna, a tributary of the Olena. The latter was traced down to its confluence with the Upper (Verkhnaya) Tomba. On the 10th of July, that is seventeen days after Chekanovski had left his camp, he reached the mouth of the Tomba and the Olena, in lat. 67° 18′ N. Daily rains had made this journey exceedingly painful, and owing to the bad condition of the pack saddles, it required much care and attention to keep provisions and instruments dry.

On reaching the Olena, the construction of a raft was at once proceeded with, for the time was too short to admit of the building of a boat, and on the 2nd of July 1874, Chekanovski began his voyage down the river. Owing to the low water and numerous sandbanks, progress was very slow. The raft frequently ran aground, and on several occasions a

ditch, some 140 feet in length, had to be dug to liberate it. At first no inhabitants at all were met with, and subsequently only a few families at intervals of 100 versts and more. The expedition was received by them with suspicion, for they had heard nothing about it, and it required much persuasion to gain their confidence. The immense windings of the river very much impeded the rapid progress of the expedition, and contrary winds at length compelled it, on the 27th September, to establish its autumn camp, in lat. 70° 28¼' N., close to the habitation of a family of natives. Chekanovski had now reached the Ulus of Chigansk, but here likewise he found that the natives had received no instructions to facilitate his progress. He held an open letter from the Governor-General, which required all Russian subjects to render him aid, and this he forwarded to the nearest Russian Government representatives, but as it was very uncertain whether that letter would reach its destination, he availed himself of an opportunity to purchase six dog-sledges, and having placed upon them the most indispensable provisions and instruments, he started with Müller on the 12th October, by land, leaving the bulk of his baggage at the autumn camp. Our travellers followed the valley of the Olena, but assistance was at hand. Chekanovski's letter had fortunately fallen into the hands of Mr. Ryeshetnikof, who was commandant of Kolymsk during Maydell's expedition amongst the Chukchi (1868-9), and who held scientific expeditions, and particularly those supported by the Russian Geographical Society, in the highest estimation. He lost no time by applying to the Government authorities, but went at once in search of a wealthy Yakut, Peter Achkasof Khatygin, who lived near Siktyakh on the Lena, and induced him to start in quest of the expedition, and thus it happened that Chekanovski and Müller, seven days after they had left their camp, met most welcome assistance in the midst of the wilderness. Achkasof at once placed his own services, and those of his reindeer, at their disposal, and his knowledge of the country enabled them to cross the Tundra in safety, a feat of considerable difficulty so late in the season. On the 1st November they had reached the mouth of the Olena, and thence proceeded to Siktyakh, where the members of the Government board were assembled at that time. They, not desiring to be second to Achkasof in generosity, at once offered to send the expedition beyond the frontiers of their district free of expense.

The shortest road not being available during winter, Chekanovski and his companions first proceeded to Werkhoyansk by a kind of winter stage, and there heard from the district captain that orders had been received in May last to render him every assistance in his power, but had not been acted upon as he had had no knowledge of what he might require. Similar orders had been sent to the captain of the Vilui district, who had been instructed, moreover, to send boats up the Olena, to meet the expedition. The final success of Chekanovski's enterprise is due solely to the care with which he organized his expedition before he left the Tunguska. Had he trusted to the assistance of government officials he would have failed.

The scientific results of this expedition are of the highest importance. Chekanovski made a route-survey from the mouth of the Kopokit up to the point where he met Achkasof. This survey joins that of the Nishnaya Tunguska, made in 1873 by Nakhvalnykh, and together with the information collected from natives, furnishes materials for a much improved map of a portion of Eastern Siberia. Müller determined the geographical position of 48 points, as well as numerous altitudes.

The magnetical observations made by Müller led to an important result. The Siberian magnetic pole according to Gauss's theory, should be in latitude 71° N. and longitude 119° E., that is, in the neighbourhood of the Olena, but Müller observed the greatest intensity near Lake Ukykit (latitude 65° 56′ N., longitude 105° E.), where it is 1·034, and found that it decreased on going thence towards the north and north-east. At the Monyero it is only 1·030; on the Olena, in lat. 67° 18′ N., only 0·991. Hansteen had previously determined the intensity at Viluisk, where it is nearly as great as on Lake Ukykit, and it would consequently appear that the Siberian pole of greatest intensity has to be looked for between latitude 64° and 65° N., and in about longitude 112° E., which is about 7° to the south and 7° to the west of the position assigned to it by Gauss.

Müller made careful meteorological observations. The absolute minimum temperature observed up to the beginning of July was —49° F. (on 19th February, in latitude 61° 30′ N.), the absolute maximum 82.76° F. (1st June, in latitude 66° 26′ N.). Abrupt changes of temperature were observed frequently, particularly in March. On thirteen days of that month, for which the maximum temperature was observed, the range of temperature five times exceeded 54° F. Thus, on the 13th of March the minimum temperature was —23°.8 F., the maximum temperature 32°. 72 F. In the beginning of May the minimum was —9°.40 F., towards the close of that month 30°, the maximum being 70°. 16 F. These sudden fluctuations in the temperature were but rarely attended by changes of weather such as are usually observed in Europe.

The expedition crossed the Polar limits of several trees. The silver poplar disappeared first, then the silver fir (latitude 60° 50′), and *Prunella vulgaris* (about 63° N.). The cedar was not met with at all, and the aspen not beyond the valley of the Tunguska. The birch, from the bark of which boats are built on the Tunguska, is frequently met with as far as latitude 63° N.; it then becomes dwarfish, and on the Monyero it is exceedingly scarce. The pine was seen on the arid slopes and heights as far north as latitude 64°. The red fir *(Pinus abies)*, which is one of the most characteristic trees on the Upper Tunguska finally disappeared on the Monyero. The only Tundra wood was met with on the Monyero, and consisted of larch trees having twisted trunks and many branches.

Chekanovski carefully attended to the geological features of the country, and collected materials for a geological map. During the first part of the journey, however, the snow greatly interfered with his observations. The hills between the Kopokit and the Monyero offer the same features as those on the Tunguska. There are gentle undulations, rounded summits, terraces, some of them columnar or forming table-mountains, and conical hills, the latter occasionally truncated. The height of one of these cones was measured trigonometrically, and found to be 1325

feet above the Surungna Lake, or 2043 feet above the Tunguska. Trap rocks predominate throughout, but other rocks are likewise met with. Near the camp on the Monyero blocks of limestone, containing corals of the Silurian age, were discovered amongst the trap, and these Silurian rocks predominated between the Monyero and the Olena, where they are intersected by dykes, and partly covered by erupted or overflown traps. The Lucha Ongokton consists of marls, capped by trap, and at its foot red and green clays, with nests of gypsum, were discovered. On the Tomba, a tributary of the Olena, corals, shells, and trilobites were found in marly, clay beds, alternating with layers of hard limestone, and marly sandstones, apparently containing no fossils, were discovered in the same locality. Further towards the north Chekanovski came upon the carboniferous formation.

It was intended at first to extend these explorations during the present year to the basins of the Anabara and Khatanga, where jurassic formations and rock-salt are said to exist, and to explore Lake Yese, the principal meeting place of the Tunguz of the Vilui district, but Chekanovski declined the conduct of this new expedition, until full instructions had been issued to the local authorities to assist him. He is engaged, at present, in working out the results of his first journey, for which purpose 1500 rubels have been granted him by the Russian Geographical Society.

RUSSIAN TRANS-CASPIAN MANŒUVRES.

SEVERAL telegrams from Berlin and St. Petersburg have recently drawn universal attention to a Russian military expedition from Krasnovodsk on the east coast of the Caspian towards Khiva, which, after the completion of the survey of the Uzboi, or ancient course of the Oxus, is to proceed southwards to survey the lower Attrek Valley. These telegrams have made quite a sensational affair of the march of this expedition into the Turcoman country; the sensational element imparted to the information, springs, however, not so much from the telegraphic transmission of the bare facts, as from the circumstance that the news has been sudden and unlooked for: that while the public were still bearing in mind the theoretic sides of the Central Asian question, which was lately re-opened in the House of Commons, they were once more apprised of Russian action in Asia, of which they had neither seen nor heard any previous indication. Quoting from the *Russian Invalid*, the correspondents of the *Times* and *Daily Telegraph* could not "wire" more than the mere gist of the notice in the *Invalid* of an expedition started in May last, and now nearly coming to an end, therefore they omitted to explain in the words of the official Russian notification that the Russian column is performing only one of the annual reconnoitring movements into the heart of the country, for the purpose of surveying little or not at all known localities, "owing to which we not only gain an accumulation of knowledge concerning the Turcoman Steppes, but also secure an intimacy with neighbouring nomad tribes."

The *Invalid*, thus divesting the military expedition of the appearance of an exceptional character and of all political significance, further explains at the outset that, "*as in years past* so in the present year, the Krasnovodsk detachment will pass the summer in the Steppes, being at the same time under orders to promote the object of the scientific exploration of the Uzboi, and to closely survey the localities belonging to us on the Attrek, a survey which was but partially executed last year."

A Russian officer writing to a Moscow paper from Krasnovodsk stated that it was the intention of General Lomakin to march so as to meet a Russian detachment coming from the Russian fort on the Oxus, and that on his way back he should erect some small forts. This probably has reference to the project of establishing a military trade-route from Krasnovodsk to Khiva, to the erection of a fort as a point of observation on the Attrek, or on its affluent the Sumbar, and also to the proposed transfer of the naval station at Ashurade to Krasnovodsk.

At the same time it was stated that some anxiety was felt at Krasnovodsk on account of the smallness of the force with which the General started on his expedition. Why this anxiety should have been felt it is difficult to guess. The march of the troops is, as we learn from the *Invalid*, the ordinary summer manœuvre in the Steppes. We are not apprised of any anticipated hostilities with the Turcomans; on the contrary, we have been led to believe that the Turcomans of the Attrek or northern slopes of the mountains of Persian Khorassan in despite of their Persian allegiance were nearly all ready and willing to serve and obey the Russians, as several of their elders were reported to have expressed themselves, and, as telegraphed from St. Petersburg, the *Invalid* announces that eighteen of these elders, with some even from the vicinity of Merv, did indeed meet the Russian General at the Igdy Wells, with professions of friendship, and perhaps also with promises of fealty and obedience.

As regards the numerical strength and composition of the expeditionary force, there could have been no reason for the anxiety said to have been felt at Krasnovodsk, unless there prevailed an erroneous idea of the scope of the operations to be undertaken.

The troops engaged in this ordinary annual manœuvre and bivouac in the Turcoman country number about 1000 men, being drawn from various infantry regiments of the Caucasus (with the exception of 100 Cossacks), and are accompanied by four pieces of artillery and a mounted rocket company. The camels, numbering 574, and the transport train, were brought down from Fort Alexandrofsk, 400 miles north of Krasnovodsk—a distance which was performed in twenty-three days. The force is under orders to march as far as the Igdy Wells, and to bivouac there, while the surveying party executed their survey up to Sary-Kamysh, under the protection of a body of Khivan militia. When this work is performed General Lomakin will receive further instructions as to the ultimate object of the manœuvre. The correspondent of the Moscow paper alluded to above was therefore in error in stating that General Lomakin intended to march to the encounter of Colonel Ivanof's detachment from Khiva, for it appears from a letter from Petro-Alexandrofsk on the Oxus, published in the *Moscow Gazette*, that Colonel Ivanof is busily engaged in clearing the banks of the Oxus, and the line of country in the direction of Bokhara, as well as the Khanat of

Khiva, of predatory bands of Téké Turcomans from Merv. These Turcomans, numbering 300 horsemen, are said to have devastated the country around the Khivan town of Pitnak, where they discomfited a body of Khivan Uzbegs, of whom they killed nineteen, and wounded a very large number. The defenceless condition of Pitnak, which is situated opposite the Russian, *i.e.* on the Khivan bank of the Oxus, is pointed out by the correspondent of the *Moscow Gazette*, as offering an allurement to the Turcoman robbers, yet the Khan of Khiva does nothing to resist these Turcoman invasions of his territories, and displays an apathetic unconcern for the safety of the lives and properties of his Uzbeg subjects and not alone had the Russian officer commanding on the Oxus got his hands full, but he was expecting to hear of a fresh raid by a still more numerous force of Merv Turcomans, who still retain in durance and in chains the Russian gunner who was captured between Khala-Ata and Alexandro-Petrofsk, when accompanying a government caravan in 1873. It is reported that steamboat communication has been re-opened between Kazala and the Russian garrison on the Oxus, although the steamer 'Perofski' on its first trip failed to reach Nukus on account of low water.

ROBERT MICHELL.

DARDISTAN.

WE present our readers this month with a map of the countries lying between Kashmir and Panjkorah. This map is still far from perfect, for the greater portion of it is based upon native intelligence, but it nevertheless contains a great deal of information not to be found on any other map published up to the present time. A short statement respecting the principal authorities upon which it is based will enable our readers to form an opinion of the dependence to be placed upon it. The British territory and Kashmir, with the exception of the eastern portion of Chilas, annexed recently, are based upon Sheets 1 and 5 of the Punjab map, compiled under the direction of Colonel H. L. Thuillier, and published in 1867 and 1872 respectively. A few additions were made from Lieutenant D. G. Robinson's military map of Hazara, published in 1855. Gilgit is based upon the sketch-map published by the lamented George J. W. Hayward, in the *Journal of the Royal Geographical Society*, and several names were added from Dr. Leitner's itineraries.

The numerous mountain summits scattered over the remainder of the map are taken from Major T. G. Montgomerie's frontier map, No. 4, published in 1873. These positions were obtained by the officers of the Trigonometrical Survey, carried on under the direction of Colonel Walker. They are exceedingly numerous, and enable us to lay down on the map the principal mountain ranges and valleys, thus imparting a degree of accuracy to the general features of the country delineated which could not have been obtained by merely combining the information derived from native travellers. The districts beyond the Black Mountains, as well as Daishi and Nindihar and Alahi are laid down from Colonel H. C. Johnstone's sketch-map of the Black Mountains, and country adjoining Ugrore, published in 1868.

The country of the Yuzufzais, including the valleys of Swat and Panjkorah, is based almost exclusively upon H. W. Bellew's excellent report and the map accompanying it, supplemented by information derived from Capt. H. G. Raverty's account of Swat (1859), the very unsatisfactory route-survey of the havildar who travelled from Peshawur to Chitral, and upon a map compiled by a native traveller in the service of the Pânjab Government, and translated by Dr. G. W. Leitner, who has published it in his work on Dardistan, just issued by Messrs. Trübner. We have been careful to lay down the boundaries of the numerous Afghan tribes, and this information will be appreciated all the more as Bellew's map is printed so badly as to be hardly legible, and these boundaries cannot be traced upon it.

The remainder of our map, including Chilas, Kandia, and other districts on the Indus, is based almost exclusively upon itineraries collected by Dr. Leitner, and published in his *Dardistan*. The task of adjusting and combining these routes was by no means easy, for bearings are not given at all, and the distances, in many instances, are contradictory or omitted altogether. Future researches will no doubt prove us to have been mistaken on several points. Information respecting these countries could no doubt be obtained easily by officers stationed near the frontier, especially since Eastern Chilas has been brought under the authority of the Maharaja of Kashmir. We venture to draw the attention of Colonel Montgomerie to these frontier districts, and trust he may be enabled, at an early date, to publish a map more complete than the one compiled by us from very inadequate materials.

E. G. R.

THE LOWER LANDES.

THE dark forests and the grey deserts which must be crossed before your tourist in search of the beautiful and the pleasant can gain a glimpse of the imperial village of Biarritz are rarely glanced at by travellers. Any novel or newspaper is preferable to a straining of the eyes towards those monstrous woods and undulating wildernesses. But if, at a roadside station, where an old woman with a blue handkerchief round her head waves a red flag, you choose to descend, taking the chance of supping off a dirty omelette, and sleeping in a granary, there is a new world open very unlike even that of the Arcachon Landes—though closely associated with them—which I have already attempted to sketch. Here, on the border, is the oasis called affectionately by its people "Paradise," for fountains and fruit-trees interpose a green line, deepened into a valley, between the two solitudes of sand. Little groves and lakes break the great and sorrowful uniformity; and the temptation is difficult to resist of eating lotuses among these shades, instead of pushing into the true country, and comparing the Born with the Bordeaux Landes. For Landes they are still, although, from the commencement of the Marensin district, they change into a comparatively fertile soil.

I was surprised by the frequency in these parts of green patches, always of course in the neighbourhood of waters without apparent source or outlet; they are often deep, and contain fish; but, in some instances, connect-

72°

73°

30'

30'

KOHISTAN

CHITRAL

DIR

SWAT

BUNER

MANSEHRA

HAZARA

PESHAWAR

KOHAT

BANNU

DERA ISMAIL KHAN

TANK

KAGHAN

Chitral 7100

Mastuj

Shishi (Shishi)

Shishi Kohistan

Mastuj R.

Yarkhun R.

Laspur

Darkot

Yarkun

Baroghil

Dorah

Shandur

Gilgit

Gilgit R.

Ghizar R.

Ishkuman

Yasin

Yasin R.

Gupis

Phander

Phander L.

Hunza

Nagar

Rakaposhi 25550

Rakaposhi

Hispar

Hispar R.

Biafo Gl.

Baltoro Gl.

Baltoro

Chogolisa

Masherbrum

K2 (Godwin Austen)

Broad Peak

Gasherbrum

Gasherbrum I

Gasherbrum II

Gasherbrum III

Gasherbrum IV

Hidden Peak

Skardu

Shigar

Shigar R.

Braldu R.

Braldu Gl.

Biafo

Biafo Gl.

Hushe

Hushe R.

Khaplu

Shyok R.

Shyok

Rondu

Rondu R.

Indus R.

Indus

Kachura L.

Satpara L.

Satpara

Kachura

Deosai Plains

Astor

Astor R.

Astor Valley

Rattu

Rattu R.

Minimarg

Minimarg R.

Deosai

Deosai Plains

Kargil

Kargil R.

Suru R.

Suru

Dras

Dras R.

Zoji La

Zoji La Pass

Kishanganga R.

Kishanganga

Neelum R.

Neelum

Neelum Valley

Jhelum R.

Jhelum

Jhelum Valley

Kaghan

Kaghan Valley

Kunhar R.

Kunhar

Naran

Babusar Pass

Babusar

Babusar Valley

Gilgit R.

Gilgit

Gilgit Valley

Ghizar R.

Ghizar

Ghizar Valley

Yasin

Yasin Valley

Yasin R.

Gupis

Gupis Valley

Phander

Phander L.

Phander Valley

Hunza

Hunza Valley

Nagar

Nagar Valley

Rakaposhi

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Hispar

Hispar R.

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Braldu R.

Braldu Gl.

Biafo

Biafo Gl.

Hushe

Hushe R.

Hushe Valley

Khaplu

Shyok R.

Shyok

Shyok Valley

Rondu

Rondu R.

Indus R.

Indus

Indus Valley

Kachura L.

Satpara L.

Satpara

Kachura

Deosai Plains

Astor

Astor R.

Astor Valley

Rattu

Rattu R.

Rattu Valley

Minimarg

Minimarg R.

Minimarg Valley

Deosai

Deosai Plains

Kargil

Kargil R.

Kargil Valley

Suru R.

Suru

Suru Valley

Dras

Dras R.

Dras Valley

Zoji La

Zoji La Pass

Kishanganga R.

Kishanganga

Kishanganga Valley

Neelum R.

Neelum

Neelum Valley

Jhelum R.

Jhelum

Jhelum Valley

Kaghan

Kaghan Valley

Kunhar R.

Kunhar

Kunhar Valley

Naran

Naran Valley

SKELETON MAP

of the Countries between

KASHMIR & PANJKORAH

including Chilas, Kandia & other Districts

of

DARDISTAN.

Compiled from the Maps and Researches of
Lieut. D. G. Robinson, Capt. H. G. Raverty, H. W. Bellew,
Col. H. C. Johnstone, G. J. W. Hayward;
Col. H. L. Thuillier, Col. J. T. Walker, Major T. G. Montgomerie;
Itineraries collected by Dr. G. W. Leitner,
and other Sources, by

E. G. RAVENSTEIN, F. R. G. S.

June, 1875.

Scale, 1:500.000.

0 5 10 15 20 25 30 Sta. Miles.

British Territory — Kashmir

Itineraries collected by Dr. Leitner.

73° 74° 30' 35'

ing canals have been constructed between points which, the inhabitants declare, were formerly bays or inlets of the sea. Many theories, however, are afloat with reference to these mysterious gatherings of water on the fringe of the French Sahara, and it may be questioned whether the Academy itself would give a preference to any one among them; but that was, at any rate, not my object. Curiosity had been tempted by the story of some cottagers who, alarmed by the sun not rising, discovered that they had been buried up to the chimney by "a blow of dust." It seemed an uncomfortable region to live in, and not a too inviting one to explore, however cursorily, since the very sea—"the sea of the Landes" it is termed—is not less abandoned of men and their works than the sandy interior itself. For it there is no Bordeaux, no bright capital of kingly Aquitaine; no anchorage, no shelter offers itself; vessels sail far aloof; for danger and dismalness appear to haunt the entire territory. Nevertheless, where men and women are there must be habitations, of whatever kind, and sundry rough huts, perched in a stray manner along the beach where it is solid, are pointed out as the habitations of wreckers, and beyond all doubt, to judge by their construction, they have been built from wrecks. Some go far enough to declare that to this day the sailors of Labourd are pirates; yet these seem to be, taken in a mass, only tales of my grand-father. I found in Marensin a plentiful cultivation beneath the shadow of the pines, and these said pines are at once the curse and the blessing of the district: in aspect nothing could be more repulsive; in beneficence, nothing could be more genial. But where to lodge for a night? they point up an avenue, black as one of Gustave Doré's distances, and say, "There." Imagine fifty Fontainebleaus in one, and then conceive the walk, until the wigwams of the Lower Landes were reached; the village of Castets, ensconced in a clearing, like that of an American forest; but hospitable so far as hospitality can be intelligible in a prairie of pine. Its people used to be turbulent on their festival days, but now they content themselves with lighting bonfires on the tops of the sand-hills, dancing about with pitch-torches in their hands, firing guns, and mocking the sorcery in which they once believed. I saw none of this, however; I only saw on the way—slightly irregularly taken, since the chance of revisiting so curious a corner of Europe might not recur—and saw with astonishment, certain ironstone monuments of an unknown date, others more recent, yet scarcely so interesting, and the ancient Basque type idealized.

At Castets there was another stranger, a French gentleman from Bordeaux, whose sketches were as irradiancies of light through these solitudes, and he told me some things worth hearing. In the first place, he said, this vicinity was flattered by the presence of many escaped convicts and absconding bankrupts, who were rarely pursued so far; that Jean Valjeans himself might have had a secure asylum here; that the local habits and characteristics are gradually wearing out; that education has made its appearance; that the Gascon idiom is softening; and that the people are actually learning French: civilization, in fact, had reached this grim borderland of a barbarous past. It must have been a simple kind of civilization, I thought, when I was shown a wealthy landlord, without shoes or stockings, walking into the dirty inn and heard him beginning a loud chatter about bull-fights and horse-races. But that was in the Marensin, and not at Castets, where this gentleman, or his representative, would, in all likelihood, have spoken and acted more brutally still. Nevertheless, let me be just to civilization, as it manifests itself in these wildernesses of pine.

Soustons, in the depths of the forest, is, be it known, an important centre; has its municipal buildings, its avenues, its inevitable four-cross roads, its hackney-vehicles, though the woods are withering around it through the excessive greed of the proprietors. Such, at all events, is the hearsay of the country people. I was not long enough in the neighbourhood to judge. But, besides the gum gathering, I saw only patches of indian-corn, oats, and rye, with what are known as "sand-grapes," red and white, yielding a beverage to which I was compelled to submit at Castets, and which was as rough as the sand itself, with an under-flavour of clay. How much of this stuff—I called it "wine"—is produced? About 100 barrels a year along the whole border! Then how comes it that the men, women, and even children here, so different from those of the Bordeaux Landes, are continually intoxicated? The very reason; their wines are more fitted to produce brandy. Brandy! well, the charcoal-burners of the Black Forest drink better, white and fiery though it be. And it is pitiable to say that, in these "other Landes," as the simpler folk of a superior region scornfully term them, each oasis of agriculture or population has it auberge, with pretty roof and porch, reeking at every night-fall with debauch, and clamorous with abominable songs, such, however, as would not be comprehended in the lowest cabarets of the Fauxbourg St. Antoine. And this, so far as my experience went, was on Sunday, but the roysterers are unremitting, nevertheless, in their devotions at the Shrine of St. Jacques.

Altogether, the denizens of this region are far less attractive than the stilt-walkers, farther on, towards the sands and bays of that pleasant Arcachon, which none can visit without desiring to visit it again. It is not that they are the more sophisticated by intercourse with great cities and corrupted populations. The contrary is true. They rarely see the face of a stranger; a railway, indeed, leaves the trail of its steam and smoke among them; but it runs between the sand-hills and the sea, and little is noticed of that country without roads, or carts, or direct communication with the outer world. Occasionally a speculator, and regularly a tax-gatherer, visits the abodes of Born, Mimizan, and Marensin; but these are only the maritime frontiers of the wilderness. In the interior, except where a sort of highway leads to Soustons, I doubt whether even a tax-collector penetrates; for what is to be gathered there? As for artists, I saw not a single easel in all the dreary land, yet it might not be unsuggestive of ideas. Now from the summit of a low hill, a unique landscape spreads itself out, barren, indeed, but picturesque; a dim yellow plain; a succession of sheets of water, dazzling, as if sprinkled with snow; a singular gathering of vapours, amid which the rising green hillocks appear like ships upon a sea; and, beyond all, a blood-red sun descending, with a force and colour Egyptian in their splendour. The few streams, slowly flowing, are nearly rose-coloured by day, on account of the soil through which they flow, and, in the evening, change from tint to tint,

until they seem, though darkly, to burn. If, then, less fascinating in the simplicity of the life they reveal than the Southern Landes, the more northern are, possibly, more naturally imposing to a foreign eye; so lonely are they, so utterly desolate, so far apart are the homesteads, and so little do they resemble — except where those cabarets I have spoken of abound—the manners and customs of Europe. Is it Europe? There might be a doubt upon that point between this and Libya. The enterprise, however, of the nineteenth century has been no more wanting to the Landes of Born, Mimizan, and the Marensin, than to those of the upper province, and similar methods are employed to check the devastations of the rolling desert.

As I have suggested, while there is less of industry, there is more of natural power to counteract the encroachments of the wilderness. It is a battle of water and sand, not the water of the sea, which merely heaps up the deposits from the shore, and aggravates the soil, but that of many streamlets pouring down, which at once feed and freshen the lakes, and keep the oases green. Perhaps, though, I may have been slightly unjust to the rough people of these villages. True, they are not like the hut-dwellers whose hunting-grounds (for resin) stretch back in such shadowy masses from that fine Biscay inlet where Arcachon has built its villas, and where the boats come in, white by day, and twinkling by night, as if a sort of enchantment had taken possession of all the scene; and it is, no doubt, repulsive, upon arriving at a primitive village, to be saluted by orgies and songs of rudeness, where something better might have been anticipated; but "let the king's justice be done," a precept I saw carved in wood over the tavern lintel of de Castets itself, and so I admit that, in one deal-built hamlet, surrounded half by precipices, and half by pines, with a shade of chestnuts above, there was a tinge of the Landes character, albeit not cognate with that of the stilt-walkers, with whom, positively, I fear I have left some human sympathies, which would never do, because they are "not Frenchmen but sand-hoppers."

At Saint-Girons-du-Champs—how like our St. Giles-in-the-Fields!—a small rivulet ran sparkling among the cabins of the poor inhabitants: there was a midnight dance going on; lurid among the trees shone the resin torches; the revellers drank—what, I cannot say, having brought my confidential dilution from Bordeaux; they jested and flirted, and might have appeared happy with their snatches of songs resembling the cries of bitterns on the edges of marshes, had it not been for the excessive pallor of their countenances, flushed though these were by the unnatural light from the improvised link-boys of the wood. I am quite aware that the hours spent amid these scenes might have been better employed in asking about the inroads of the sea upon the sand, the development of lacustrine enterprise for the furtherance of projects which shall cause the desert to blossom as the rose, and the increase of alluvial as compared with sandy soil. But it cannot be helped, and although in the ordinary course of things a house is, or should be, more interesting than a rock, and a field of corn than a barren beach, occasions may arise in which the ruin may triumph over the castle, the stone over the structure, the barrenness over the harvest. It is, of course, consolatory to know that the valleys of Medoc were once parched wastes, and are now among the wine-gardens of France. All things come to those who wait, according to the national proverb. Meanwhile, is it wrong to rejoice that there survives, within those near limits, an Egypt without corn? Not for long, however. The cultivation of these wildernesses is, as I have before endeavoured to point out, an ambition which fascinates many Frenchmen at the present day; doubly so, because they have to deal with lands, not merely barren, but shifting also. The purchasers of estates have to fix their position before undertaking to cultivate them. It is as though a building speculator were to stipulate that his plots should not be overwhelmed by the sea or sunk by an earthquake; but the future is full of hope for these conquerors of a wild land, by no means so wretched or so desolate as fantastic Parisian writers, for the sake of effect, often represent it to be.

There is a little, it may be allowed, in the more northern to compare with the Southern Landes. I did not, at any rate, meet in them with the same pastoral characteristics, so to speak, because, to my mind, neither of these deserts is Arcadia—yet between two things, not copied one from another, there must be a contrast, more or less, and I prefer the quiet songs, and innocent dances of the tree-made huts, where the stilt-walkers stand, while their wives and children dance, sometimes on stilts also, though very far from resembling Mr. Sleary's troupe, to the better educated savages of de Castets, or the accomplished topers and songsters of St. Girons-du-Champs. In the one, I saw the white Indian simple; in the other, the Red Indian, metaphorically speaking—a little cultivated by whisky—distilled from vine-tendrils, leaves, and grape skins. The question now is, will these populations, the one so different from the other, disappear? The Landes, in their actual state, unquestionably will, since water can convert sand into soil anywhere throughout the world; but, for all their stilts and their long-descended prejudices, I imagine that the Landais, instead of being "wiped out," will rejoice in the possession of a fertile, rather than of a hungry and ungrateful region.

HORACE ST. JOHN.

THE SCIENTIFIC WORK OF THE ARCTIC EXPEDITION.

SHORTLY after Mr. Disraeli's Cabinet had resolved on the despatch of an expedition to the Polar regions, the President and Council of the Royal Society were invited by the Lords of the Admiralty to offer any suggestions which might appear to them desirable in regard to carrying out the scientific conduct of the expedition. The result of this proposal is now before us in the shape of a bulky manual, of the natural history, geology, and physics of Greenland and the neighbouring regions, together with a series of instructions for the guidance of Captain Nares and his officers for the further prosecution of the knowledge already acquired and detailed in the manual. The whole has been ably edited by Professor T. Rupert Jones, F.R.S., under the direction of the Arctic Committee of the Royal Society, and published by authority of the Lords Commissioners of the Admiralty.

In addition to the above-named manual and instructions, we have also a selection of papers on Arctic geography and ethnology, reprinted by order of the Royal Geographical Society, forming in all a goodly quota of scientific Arctic literature, and leaving but little to be desired for the instruction and guidance of those gallant fellows now on their way northward.

The manual consists principally of reprints and excerpts from transactions, proceedings, journals, magazines, and other widely-scattered sources, now for the first time collected within the compass of one volume. These detached papers are divided into two parts, the first relating to biology and zoology, and the second to physics. Notwithstanding the haste with which the whole has been compiled, it is almost a marvel that so much has been done, and done so well, in the limited time.

The first part is subdivided geographically into three districts, the first including Davis Strait, Baffin Bay, and the coasts to the northward; the second, the great mass of islands or Arctic American Archipelago lying between Baffin Bay and Behring Strait; and the third, East Greenland, with Spitzbergen and Franz-Joseph Land.

It would be a mere recapitulation of names of authors and their works to attempt to give any account of the contents of this manual. A large portion of the contributions is from the works of Drs. Robert Brown, C. Lütken, and J. D. Hooker; but there are several most valuable monographs from the pens of other writers.

The instructions for the use of the Arctic expedition are, like the *Manual*, divided into two parts; but strangely enough, as proceeding from the same editor, the subjects are in inversed order, Part I. of the Instructions relating to Physics, and the second part to Biology.

The Instructions for Physical Observations deal first with the astronomical phenomena that will probably occur in the regions in which the ships may be at the time; the eclipses and occultations having been carefully computed by Mr. Hind, the superintendent of the *Nautical Almanac*. The occultations include the stars of the fifth magnitude, that may be visible in or near 80° N. latitude, and 60 W. longitude.

The suggestions for observing the tides, by the Rev. Samuel Houghton, include a summary of Arctic tidal observations already made, which, scant as they are, will prove of great importance when collated with those that will be obtained by the present expedition; but the difficulties in making a successful series of tidal observations in such a climate, as may naturally be supposed, are very great, and unless they are observed serially and with great care, they are of little value. Dr. Houghton suggests hourly observations of height for one month at the times of the solstice and equinox, while at intervening periods the tide should be registered every *four* hours of *mean solar* time. This amount of observation can scarcely be expected, for at the period of the winter solstice it will scarcely be practicable, and at the time of the summer solstice the expedition will probably have too much work to be enabled to spare observers, even should other circumstances be favourable. At the time of the equinox, observations may be made with advantage, if the passages are not too much hampered with ice to prevent the flow and ebb of the true tidal wave. As much depends on the observation of tidal phenomena, it is greatly to be hoped that a good series may be obtained.

The tidal instructions are followed by those for Pendulum Observations for determining the figure of the earth, by Professor Stokes, the Secretary of the Royal Society; and these by directions for collecting the meteoric (cosmical) dust, as detected by Professor Nordenskiöld, in regions far distant from any source of dust.

As may be imagined, the subject of Terrestrial Magnetism is considered one of importance, and the three consecutive maps appended to this section of the Instructions, are in themselves extremely interesting, especially those relating to Inclination (Dip of the Needle), and Declination (variation of the compass). The Instructions are by no means lengthy, and may be summed up in the first paragraph, which states that "The determination anywhere in the Arctic regions of the elements by which the earth's magnetic force is usually expressed (*Declination, Inclination, and Intensity*) will be valuable."

Magnetism is followed by Meteorology, the instructions for which were prepared at the Meteorological Office, from which department also the meteorological instruments were furnished. *The quality of observations* is insisted on as *of much greater importance* than the quantity, and two-hourly or even four-hourly readings are recommended. Very clear and explicit directions are given for the thermometric and hygrometric observations. As in a measure connected with meteorology, a few notes on observing auroral phenomena is added by Professor Stokes, but as these cease with a very high latitude, we fear that but little will be added to our knowledge from the voyage of the 'Alert' and 'Discovery.'

The instructions for ascertaining the electrical state of the atmosphere are by Professor Sir William Thomson, but the observations and the instruments themselves are of so intricate and delicate a nature that, without some previous knowledge of the subject, it would be impossible to give a fair idea of the observations required, within the space alloted to us.

The science of Optics is one which of late years has become of considerable importance, through the invention of the spectroscope and the investigation of the laws relating to polarization of light. This has invested the observations to be made by the Arctic expedition with a greater interest than that attaching to any previous expedition. Very precise instructions are given for observing the solar spectrum, with a view to terrestrial absorption and the spectrum of auroras. Spectroscopes are supplied specially for each purpose.

The article on Polarization of Light is, as might naturally be expected, by the Treasurer of the Royal Society, Mr. Spottiswoode, and clear and explicit directions are given for the detection of polarization in auroras and ice-blink, suitable prisms having been furnished for these observations.

The physical portion of the instructions concludes with some very practical hints towards observations in the Arctic Regions, by Professor Tyndall; those with regard to the movement of the Glacial Sea, both at the coast and inland, will prove particularly instructive, should the 'Alert' or 'Discovery' be in a position to watch its movements by means of theodo-

lite angles. The range of sound and the aerial echoes are also dwelt on as worthy of observation.

The instructions to the naturalists engaged in the Arctic Expedition will keep those gentlemen well employed if they can attend to even a small portion of the subjects to which their attention is solicited. The first section of these instructions is by Dr. Albert Günther, F.R.S., on the Mammalia of Greenland, and although the number is small, the observations that may possibly be made on them will be valuable, and particularly in their distribution or gradual disappearance towards the Pole. The naturalists are earnestly exhorted to collect any new or partly new species, met with north of 80° N. latitude, and directions follow for ascertaining the peculiarities of some of the well-known species which the absence of skilled naturalists in former expeditions have prevented from becoming known.

The Cetacea are next described by Professor W. H. Flower, and useful directions are given for observing the habits and peculiarities of this interesting order. Where practicable, good and accurately coloured drawings of the animals from actual measurements are a great *desideratum*. The contents of the stomachs are to be noticed, with a view to ascertain the natural food of the animal. The description of the different species are briefly described, but still with sufficient detail to enable an unscientific observer to distinguish them.

The instructions in Ornithology will not prove difficult to carry out, "all being fish that come into the ornithological net." Excepting in the very commonest species, specimens should be preserved of all the species of birds met with during the expedition. Examples of both sexes in their various plumages, of the eggs, nestling, and immature form of such as breed in the country, should be preserved. This, we should think, with the number of fowling-pieces on board, will keep the hands of the collectors well in. But there is one particular instruction to the collector not given, which we think might have been added, the more especially as the duty may fall on the unscientific, although maybe ardent collector, and that is, careful measurements of the bird as soon as possible after its being shot, and before skinning, for we may see in some of our best museums birds set up with elongated necks, such as are never seen in nature.

The instructions on Ichthyology are by Dr. Günther, and should more properly have followed his paper on Mammals.

Mr. J. Gwyn Jeffreys, in a short paper, gives directions for making observations on and collecting Mollusca, but excepting under very favourable circumstances, we cannot expect that much will be effected in this branch of science; the towing-net of muslin or fine gauze and the dredge, are very agreeable articles to handle, and the examination of their contents very interesting to separate from the *débris* in a tropical or even temperate climate, but when everything freezes the moment it is out of the water it requires great zeal and perseverance to devote oneself to this pursuit.

Dr. Allman's paper on collecting and preserving Hydroids and Pollyzoa, is almost too scientific for any but a skilled collector, which we think a pity, for many sailors become active collectors if taught in a simple way. His instructions on the construction and method of using the towing-net, and notes on the animals that may be obtained by its employment, are more explicit, but the same remark on the uncongenial nature of the employment will hold good, as made in the preceding paragraph.

The instructions in Botany, by Dr. Hooker, form one of the most interesting papers in the whole series. Apart from its direct object, it is commendable as being written in such simple language that an intelligent seaman could undertake the work of a scientific collector with very little extra aid. This may more particularly be said of the section on the collection of Marine Algæ. Particular attention is directed to the ascertainment of the power of seeds to resist cold whilst retaining their vitality, and samples of various seeds are furnished for the purpose of testing them, plain and simple instructions being given for making the experiments, which will prove an interesting subject for study in the long winter night, when different gradations of cold may be regulated, although in this case the absence of light may possibly interfere with their germinating so freely as they otherwise would. The seeds supplied for experiment are mustard, cress, radish, turnip, pea, bean, sweet-pea, wheat, barley, oats, and maize.

The temperature to which Arctic plants are exposed during the winter, where covered with snow, is also a subject for investigation.

The general instructions for observations in Geology, by Professor A. C. Ramsay and Mr. Evans, the President of the Geological Society, commence with an enumeration of the implements and instruments required in carrying them out. The directions are very explicit, and are greatly aided by woodcuts, particular instructions being added for glacial observations.

Professor N. Story Maskelyne, F.R.S., has added a paper on collecting Mineralogical Specimens, in which he lays much emphasis on the necessity of collecting specimens of every distinct kind of rock, and he adds —"To the mineralogist rock specimens have a special interest as being aggregates of minerals, and often containing crystals in cavities, or otherwise distributed through them, from the presence of which the history and associations of the rock itself may be gathered. Hence a judiciously made collection of rocks has the character of an index to the petrology of a whole country."

The subject of Meteorites and Meteoric Iron in connection with Greenland is naturally an interesting question, and directions are given for a careful examination for it at a place called Ofivak in the island of Disco, from whence Professor Nordenskiöld brought some large masses of meteoric iron, and since which a mass of iron of nearly twenty tons in weight has been brought.

The concluding paper of the instructions is by Mr. J. W. Judd, on Volcanoes or evidences of volcanic action, a class of inquiry which will prove difficult in an Arctic continent.

The "Arctic Papers" of the Royal Geographical Society form an excellent addenda to the Manual of the Royal Society, nor can they be termed altogether reprints, as, for instance, the principal part of the paper, "Notes on the State of the Ice," by Admiral Sir R. Collinson, which, although having little connection with the route followed by the present Arctic expedition, is, nevertheless, of great interest, as

bringing together a number of stray and otherwise detached observations of general importance. The notes may prove of great service to Captain Allen Young's Expedition, for if he is successful, as we hope he may be, in getting to the southward through Victoria Strait into Dease and Simpson Strait, there is every probability of his being enabled to coast westward along the north of America to Behring Strait. The first article, "On the Physical Structure of Greenland," is also one of importance and great interest. The article on the "Western Eskimo," by Dr. Simpson, is full of observations on the habits and customs of that most interesting people. The work closes with a number of questions of *desiderata* for the consideration of the voyagers.

As a kind of supplement to these manuals and instructions, the Hydrographic Office of the Admiralty has issued a pamphlet of hydrographical remarks on Davis Strait, Baffin Bay, Smith Sound, and the channels northward to 82¼° N., compiled from various authorities.

"In a multitude of councillors there is safety," but when we glance at this pile of advice and instructions, our thoughts can but turn to the means for carrying them out; certainly two scientific gentlemen are appointed to the expedition, and we do not doubt their zeal and ability, but apart from those observations on Magnetism, Meteorology, &c., that will devolve on the officers of the ship, there is sufficient to engage the attention of half-a-dozen scientific men, not to specify more particularly a trained geologist, the want of which is a serious loss; true, some volunteers may be found among the civilian officers of the expedition, the medical staff will probably greatly aid in collecting and preserving specimens; the chaplains, also, may do good service beyond their clerical duties, if so disposed; and as the opportunities of collecting will be but few—for the ships and travelling parties cannot afford to be delayed for the purpose of collecting—it will be at those opportunities that a number of collectors will be most desirable, so that, with the guidance of the skilled gentlemen, we may still hope to realize a good harvest from the scientific work of the Arctic Expedition.

SIGN-POSTS ON OCEAN'S HIGHWAY.

The Physical Education of Dust.—Mountains.

"The strata of the entire cretaceous system exhibiting a gradually deepening sea bottom."—C. E. de Rance, *Geological Magazine*, No. 120, June 1874.

There are certain dynamical laws to which we dusts must conform if we wish to retain our positions in cosmical transactions. In our trinity of earth, air, and water the two last are active, the first is a passive element; it is at present composed of countless materials; we dusts are the minute types of all. Each and all of us accept the attentions of the active elements, but no two of us have the same mode of doing so. As their attentions are for ever changing their expressions, it follows that the conditions of acceptance must also vary, so that, individually and collectively, the dusts undergo never ending changes and movements.

The catalogue of materials that have from time to time been subjected to the attentions of the water or the atmosphere, are strictly preserved in the heights above, and in the depths below the waters; the whole formation is the result of the physical education of dust. We shall endeavour to confine ourselves to the actual construction of mountains in this chapter, so that it will be well to have a definite idea of what a mountain is.

There are degrees of comparison all through nature. A mole-hill is a mountain to a worm, an ant-hill is a mountain to a beetle, Greenwich hill is a mountain to a boy, and the Matterhorn is a mountain to the members of the Alpine club; all in turn climb up each, with a strong probability of coming down again. Any decided rise of cosmical matter, above the ordinary level of the locality, is a mountain to suit our purpose. All our mountains are composed of cosmical matter. Dust in some shape or another is present in every mountain. We have a visible tangible mass before us, composed of visible tangible material. The questions are, how came the dusts there? and why do they rise above the ordinary level of the locality? It would be easy to answer these questions at once, but the clouds that cling to the mountain brow have thrown a haze over attempts at clearing up their origin. An encyclopædia has pointed out that all attempts to generalize on the construction of mountains have failed. There must be some reason for this, so that before recounting the physical education of our ancestor, it will be as well to wait till we can clear off some of the haze, and the long, long lines of clouds above our heads.

Of all the authorities we have ever rested on, Sir Charles Lyell has described mountain formation most accurately in his description of the sand ripples on the sea shore. Atoms are impelled upwards till they form a ridge—an exact miniature mountain range is recorded; but Sir Charles did not carry out the principle to its legitimate limit. Again he saw similar formations in his North American travels. Writing of the islands in the State of New York, in vol. ii., p. 109, he says, "This great beach or bank forms a line of spits and low islands . . . They are all narrow and long, and when above the reach of the surf they are covered by a labyrinth of hillocks of sand, imitating almost all the variety of form which snow-drifts present after a storm." At page 103 he tells us of the parallel ridges between lakes Ontario and Simcoe. The first ridge is steep towards the lake, 20 to 30 feet high; its base is of clay, its top is sandy, it is 108 feet above the level of Ontario. The second ridge is 208 feet above the lake, and 50 to 70 feet above the ground on either side; there are boulders at its feet, and some at its top; the distance between these ridges was 2½ miles. The third ridge was 5 miles from the lake, with a slope of only 10 feet. There are eleven traceable ridges "which cover everywhere the subjacent Silurian rocks." After a rise of about 680 feet on the Ontario slope, there is a descent of 282 feet for 42 miles to Lake Simcoe. On this slope are several ridges "at levels precisely corresponding to those which I saw on the south side." All these ridges are said to correspond with those on the uplands of the Ottawa River, and, says Sir Charles, "I consider the ridges marks of ancient water-levels, between Toronto and Lake Simcoe as referable to ancient beaches and lines of cliffs formed on the margins of channels of the sea. . . . . Others, including some of the loftiest ridges, as

having originated in banks or bars of sand formed, not at the extreme edge of a body of water, but at some distance from the shore, in proportion as the waters obtained a shallowness by the upheaval of the land"—Sir Charles did not know that the shallowness was caused by the retiring of the waters. He tells us, "It is well known that on many shelving coasts the breakers give rise to banks of sand at no great distance from the beach." We shall see the legitimate end of these actions presently. Sir Charles Lyell had only one idea of mountain elevation, that idea was the cloud that clung to his mountain formation, obscuring his understanding, while his eyes perceived the action of the active forces on the passive dust.

Sir Charles mixes truth with fiction so closely that it is difficult to see the light. When writing of the fractures and fissures of the Appalachian Mountains, he tells us that "these changes have consisted of the denuding operations of the sea, which probably took place, in great part at least, during those movements of elevation which, after the period of the new red sandstone, uplifted the Appalachian strata to their present level above the ocean." The denuding system only is required to produce the changes; there was no occasion for any uplifting. Sir Charles goes on, "It was truly remarked that during the process of congelation and contraction the incumbent strata, or those first solidified, would sink and accommodate themselves to a narrower area, namely, the circumference of a spheroid of smaller diameter, and, according to their different degrees of pliability or hardness, the beds would be bent or broken." When we come to denudation we shall comprehend more about this sinking. Sir Charles tells us it happened from "the supposed original fluid nucleus of the planet, it being assumed that the earth passed gradually from a state of fusion by heat to a solid condition." Having supposed, and assumed this state of things, Sir Charles blows away his clouds by telling us—"We have only to substitute the partial liquefaction of the interior of the earth at moderate depth for the primitive fusion of the entire incandescent nucleus, and to suppose that each local development of subterranean heat was followed by refrigeration, and we shall discover a cause fully adequate to produce the fracture, plication, and lateral pressure of rocks, at as many successive periods of the past, as the facts now established in geology require."

It is curious to follow the footsteps of those who have followed Sir Charles up his cloud-covered mountain. We will take a step upon the path taken by Mary Somerville in her *Physical Geography;* strangely enough it makes a distinction between Sir Charles and our soundest geologists. She tells us that "the increase of temperature with the depth below the surface of the earth, and the tremendous desolation hurled over wide regions by numerous fire-breathing mountains, show that man is removed but a few miles from immense lakes or seas of liquid fire." We remark in passing that the probabilities of Sir Charles are now certainties; but Mrs. Somerville is very honest, she tell us a few pages on that "there is no proof within the historical period that any entire mountain chain has ever been raised at once, although it is generally *admitted by our soundest geologists* that such took place at remoter periods, and that by this means the great mountain chains of our globe have attained their present position." She then tells us that a *contrary opinion* is advocated by *Sir Charles Lyell*: "elevation has been produced by a long continued and reiterated succession of internal convulsions, with intervals of repose." These are all clouds that will vanish when the wind blows.

No sooner are they gone than another dense mist is wafted over the scene, till we almost think the point we strive to climb to is itself a cloud. Mrs. Somerville tells us that "fossil shells of different geological periods are found at various elevations, which shows that many upheavings and subsidences have taken place in the chain of the Andes." The clear mathematical understanding of the lady is here misguided by Mr. Darwin, "who supposes that the whole range (of carboniferous limestone) after twice subsiding some thousand feet was brought up by a slow movement in mass during the eocene period, after which it sunk down once more several hundred feet, to be again lifted up to its present level by a slow and often interrupted motion." Mrs. Somerville is a favourite authoress; we seldom find a protracted rest upon her volumes, but we do wish that she had climbed her mountains without a guide.

Cloud after cloud still rises up the mountain side to impede our view; lakes, rivers, swamps, the plains, the forests, all contribute their fleeting clouds, and as they flit through deep ravine, as they sweep along the scarp, or slowly climb the half hidden brow, we begin to be impatient, and say that we cannot reach our summit to-day; our silent guide signs patience, waving his hand to tell us that they are rapidly flitting away. As we look at them, they gather in waving, still condensing masses; still rising, and forming a straight line resting on the mountain top. As nature gathers her moistures together, so Henry Woodward has gathered for us some of those misty mountain formations which we must see through before we can find our way; they are in No. 114 *Geological Magazine* for December 1873. We are told that "the question of the formation of mountain chains has of late occupied the consideration of many of our ablest and most profound physical geologists." As the cloud-line along the mountain top is the result of one cause, so "all the corrugations of the earth's surface . . . are to be regarded as the effects of one and the same cause."

If Mr. Woodward had stopped there, nature might sooner or later have asserted her rights in the enquiring mind of man; but he leads his audience back to his own cause; "whether we regard the earth as an oblate spheroid, perfectly solid throughout, or as having a more or less thick crust and a fluid interior, we are justified in considering it as suffering from cooling by radiation, and contracting in a more or less degree from a time long antecedent to the formation of the very oldest metamorphic or sedimentary deposits with which we are acquainted." We cannot waste time by asking why the solid body should be hot, or why the earth should suffer; there is no surmise, no probability now, all is certain. Mr. Woodward tells us, "thus through the unequal contraction of the earth's crust, by which the great continental areas were originally elevated as vast anticlinals above the general ocean, the first preliminary stage necessary for the commencement of mountain formation would be accomplished." We are not told what the continents were formed of, or whether the vast anticlinals were

cracked and fissured, but Mr. Woodward clothes them with sediment "resulting from meteoric action" to the depth of 10,000—20,000 or even 40,000 feet in thickness." Having done this, he asks, "Why does the yielding to horizontal pressure take place along these lines of deposit in preference to any other?" We remark, in passing, that the fact of horizontal pressure is not proved. We shall have a good deal to say about it, when we come to the denudation of those mountains which we are now trying to build up. Mr. Woodward finds an answer to his question. Professor Joseph le Conte suggests that the answer is to be found in the theory of the aqueo-igneos fusion of deeply buried sediments." We shall return to this quotation when we come to the pyrotechnic education of our ancestors.

Mr. Woodward found he had a heavy work on hand. The professor required aid. "Scrope, Babbage, and afterwards, Sir John Herschell," are called in to show that "the accumulation of sediment necessarily produces a rise of the geo-isotherms, and an invasion of the sediments by the interior heat of the earth." Here we have fiction and truth in a tangible shape. We (dusts) know nothing of interior heat, excepting that which we do produce, with which we make our volcanic mountains, and no others. Mr. Woodward having made one false step by introducing the invasion by interior heat, is obliged to show how it acts on the areas that had already began their mountain formations—that had cooled and contracted theoretically. He thinks that "even the former moderate temperature, long continued in the presence of the included water of the sediments would be sufficient to produce incipient change—at least segregation, if not metamorphism," and then, having settled the point that the temperature "of sediments, 40,000 feet thick . . . . must be nearly 800° Fahrenheit," he tells us that "such a temperature is certainly sufficient to produce not only metamorphism, but aqueo-igneous pastiness, or even complete aqueo-igneous fusion."

We cannot stop here to ask Mr. Woodward how it was that water was still included in the sediments, where the heat was, as he supposed, sufficient to produce metamorphism; we should be only producing more vapour, and greater obscurity, just as our atmosphere shows symptoms of clearing, for again Mr. Woodward hits off the truth—"with a small quantity of alkali in the included water of such sediments, all these changes would take place at a much lower temperature." Mr. Woodward is so correct on this point, that we ask in passing—Why, if a little alkali in the water could cause such a result, a larger quantity of alkali should not cause actual fusion of the rocks? We cannot answer that question till we have constructed our mountain; if we lose our clue in the pathless wastes, we should never find it again.

We have now to connect the theory before us. It is evident that if there was a melting of the sediments at a depth of 40,000 feet, there would be some pressure, so Mr. Woodward tells us that "subsidence probably continues during this process." If the process exists, he might have used certainly instead of probably; but he gets more confident as he goes on with—"Finally this softening determines a line of yielding to horizontal pressure, and a consequent upswelling of the line into a chain. Thus are accounted for, first the subsidence, then the subsequent upheaval, and also the metamorphism of the lower strata so universal in great mountain chains." We shall comprehend sooner or later that the metamorphism, the upheaval, the subsidence, the pressure, and the softening have no connection with melted sediments in the history of mountain formation. Mr. Woodward, however, concludes his theory or his address, as far as we are at present concerned, with, "Thus, the phenomena of plication and of slaty cleavage, demonstrate a crushing together horizontally, and an upswelling of the whole mass of sediments . . . sufficient to account for the elevation of the greatest mountain chains in the world." This is very similar to what Sir Charles Lyell told us.

We had almost determined to begin our ascent here, but there are two theories that must not be passed over, because they have both attracted some attention. In the *Geological Magazine*, No. 115, Captain F. W. Hutton tells us, in reference to the contraction theory of the Rev. O. Fisher, that by it "utter confusion would reign in stratigraphical geology." The Rev. O. Fisher, in *Geological Magazine*, No. 116, remarking on the deposition theory of Capt. Hutton, says, "I should like to see a diagram showing a range of mountains formed on Captain Hutton's theory." There are those who, in their mountain wanderings, have seen patches of vapour floating upwards from the gorges on the opposite sides of ridges: the silvery vapour is very beautiful. We stop to gaze on the wondrous evolutions of each mass; we begin to think that, as they must inevitably meet on the ridge, they will envelope the scenery, and hide the view; but as each mass rises from its gorge, they meet, they kiss, and then, instead of expanding, both masses rise, revolving in vertical circles, till, like the *mares tails* in the summer sky, they mix with, and are lost in the eternal firmament around them.

We believe that Mr. Woodward and his school have built up their mountain ranges by the assistance of an internal self-existing fire of which they know nothing. Illustrious painters have given clothing and feathered wings to their cherubs, and their angels: they do not know if feathers or clothing are to be found in the heavens. Our geologists do not know if fuel or fire are to be found in the earth below; but as long as human imaginations sway the pen or the pencil, so long will the fires burn, and the feathers grow. We are led back by these thoughts to Plato, who makes Socrates tell Gorgias that the "Rhetorician therefore does not profess to teach courts of justice and other public assemblies, respecting things just and unjust, but only to produce belief."

We dusts cannot find our way through the fire world; but we find in *Chambers' Cyclopædia* a remark that leads us back to our own sign-post.—"To suppose (said Professor Rogers) that mountains are elevated by a wedge-like intrusion of melted matter is to give to a fluid functions incompatible with its dynamic properties. So also the supposition that the igneous rocks were intruded as solid wedges, separating and lifting the crust, is opposed to the fact that no apparent abrasion, but generally the closest adhesion exists at the line of contact." Plato thought that the believers were worse than the teachers of error. We beg here to remind our readers that all the mountain formations we have touched upon are only theoretical, while the biography we are detailing is founded on those laws

of nature which are now, and for ever have been, in action. Previous chapters have taught us how the cosmical trinity brought about the birth, and the multiplication of dust. We have shown results under the doctrine of wisdom, "forsake ye not my law;" we have now to consider the education of dust in other seasons, when the gentle handmaid gave place to her rough brother, and when the summer ripple of the waters was changed into the raging billow. The scene seems full of confusion, we imagine ruin and destruction; but all is done by the law. As the muscles of man are developed in his gymnasium, so the girders of this earth were developed by dust, under the tuition of wind and water in the boundless gymnasium of this round globe.

We have to begin at the beginning, we have to comprehend the character of the professors before we can understand the nature of their doctrines. The wind must be looked at in every condition of force, from the fresh breeze to the hurricane, from the little whirl that licks up the dusts of our streets to the great whirlwind that severs the mountain top, that lifts up the ocean, that buries the caravan, and that even now eclipses the mid-day sun. Different localities have different names for these blustering actions of nature: the tornado, typhoon, simoon, monsoon, storm, and hurricane all come under one head, as our Professor Wind, brother to the gentle handmaid Air, and as sooner or later her successor in the education of the dusts of this earth. We have to look upon the water not only as affected by all the varied actions of the wind, and thus aiding in the education of dust, but as having special classes in his own vast gymnasium. In every class, separate or combined, under the instruction of water, or under the influence of wind, dust had to undergo his physical education.

Long before dry land appeared nature was preparing its solid foundation; that foundation is here now, and on that foundation the waters have been at work for untold millions of years. There are two actions in that work, one destroys, the other constructs. We cannot explain these actions better than by quoting a few passages from the report of Captain Nares, H.M.S. 'Challenger,' to Admiral Richards, late Hydrographer of the Admiralty, dated 18th January 1873: "At the depth of 2025 fathoms on the east side of the rise, the sounding-rod was filled with decomposed rock, showing a rocky foundation; the dredge, however, brought up ooze." Here we have examples of construction and destroying close to one another. "The rocky nature of the bottom, and the lowering of the temperature usual at that depth would indicate a considerable movement of the lower stratum of water. At this position the dredge brought up a quantity of dead hard coral . . . with no mud." Thus the forces of the water permitted no sediment, but allowed hard material to drift over the rocky bottom. "The several deep soundings taken in the neighbourhood of Bermuda prove it to be a solitary peak, rising abruptly from a base of only 120 miles in diameter." This shows that mountains are formed on the sea bed. "The stream rushing past us like a mill race," tells of the vast power of ocean currents.

From another report, dated 15th September 1873, we gather that at the Cape de Verde Islands, "the bottom water turned to run north more than half-an-hour earlier than the surface, and ran six and a quarter hours—a regular tidal interval." So that the atoms of the same material held in suspension or solution may be conveyed to different places. "It is remarkable that the temperature at 80 fathoms, the depth at which the coral grows, is the same as that of the Mediterranean coral banks, viz., 52°; showing that water life requires similar temperature in varied places.

In a report dated 15th December, 1873, we find that in Simon's Bay "the current usually circles round from Cape Agulhas to Cape Point; on this occasion, while the water was gradually cooling, a current was circling round the bay in the opposite direction," telling us that currents can be altered by heat, by cold, or other influences.

We find in the abstract of Captain Nares' deep soundings, that the nature of the bottom does not depend on depth, 1800 fathoms gives mud, 325 hard ground, 2125 sand and mud, 2025 rock, 2435 globerizine ooze, 3025 red clay, 390 coral mud, 435 coral and shells, 175 sand, 1370 sand, 51 rock, 83 stones and gravel, 1775 rock, 2650 ooze, 750 rock, 2675 ooze, 820 rock, 2150 ooze, 500 mud, 32 sand and coral, 1600 mud, 1000 shells, 2025 globerizine ooze, and 1100 rock. Every one of these quotations tell us not only of the materials placed at the disposal of the water, but each discloses the character of the water on the locality, to which we shall refer presently.

Under the influence of wind and water the ocean bed has acquired the condition depicted by Captain Nares. The influences which have produced this uneven bed have been going on for ever. Before the productions of land and water gave materials to build with, the bed of the waters alone supplied them; the formations of those days consequently assumed the character of the materials moved by the waters. We find on mountain top, in the mountain interior, in the schists, in the granites, the gneiss, syenite, and many other rocks of the present time, above and below the sea level, the types of the only material available when dust began his physical education. All authorities consent to call these rocks primary; they belong to the so-called azoic epoch, and the illegibility of organic remains in these rocks gives a colour of truth to the nomenclature. The structure of these rocks is however so variable, the remains of organisms are so illegible, that no line can be drawn between the azoic and the palæozoic epochs. The flint nodule that has formed beneath the chalk is in itself an azoic mass; but it belonged at one time to a living organism; the siliceous matter which constitutes so large a portion of these primary rocks is a moveable, percolating substance, so that it is not impossible that the siliceous matter of these so-called primary rocks may have at one time belonged to organisms, which used silex for their clothing and their houses, as the diatom and the grass now do. We, therefore, abstain from using the titles that geology has adopted, our cosmical water-bed is formed here and there of materials, similar to those we find at all depths, and all heights; our little ancestor was born of this material, and this material, as dust, had to undergo its physical education.

We have shown in the birth of dust how two long epochs of uncounted time worked up the water-beds to form the first dry land. Sir Charles Lyell has told us how the waves leave the sand ripples and the larger ridges behind them. As the waters do these things now, so they did then in the third day of crea-

tion, and as Captain Nares finds the sea bed now, so was it in those long-forgotten days.

There was no hesitation in the wind when he began to educate dust, there was no disobedience in dust when he entered the gymnasium. Action became involuntary; he hopped, he jumped, he flew, he danced in circles small and vast, he mixed with unknown associates, he was deposited here to-day, and there to-morrow, his heavier comrades paused at the bottoms of the slopes, the lightest only stopped when the professor himself was out of breath with his exertions, and so, as Sir Charles Lyell found light sand on the clay spits of America, the lightest dusts took up the highest stations in their cosmical gymnasium.

We have shown in the multiplication and addition of our ancestor how soon his faculties were required to act. We pointed out that wisdom never allowed her servants to rest; there was always something to be done, and some one to do it. Thus, as creation went on, the winds had more to do, more pupils to attend to, still the same education went on; dust was constantly ushered into the arena, and as constantly left upon high places, heaped together in vast masses, shunted into little drifts, or deposited in the waters for further instruction there.

The discretion of the two professors was wonderful, scholars of all gifts, of all characters, and all abilities were placed under their care; they were mixed up in the fiercest strifes of elemental action; their nature, their capability was tried to the utmost; the rough were smoothed down, the heavy were in one class, the light in another, and as, in the depth of the Atlantic, the 'Challenger' discovered the light shells of foraminifera on the higher spots, and their clay on the lower, so, all through the physical education of dust, the professors have been careful to distinguish the characters of those entrusted to them. Thus, as Sir Charles Lyell saw in America (*Travels in North America*, vol. ii., p. 176), "above the granite, clay, slate, quartzite, and Silurian formations of Nova Scotia there occur strata referable to the carboniferous group occupying very extensive tracts, and resting uncomfortably on rocks of the older series." This uncomfortable condition shows that the present irregular sea bed existed when these formations were deposited upon them; and we see that under varied forces of wind and water, with varied materials at their disposal, such a result was unavoidable, while the law was not forsaken.

Under the laws laid down by wisdom, and adopted by the two physical professors for their separate, and for their united classes, the material entrusted to their care became developed in certain places, just as muscle becomes developed in the human frame by action. Before organisms were created, the winds and the waters gathered the primeval silicious matter into sediments and drifts; as Sir Charles Lyell found the light sand over the clay, so the lightest materials were worked to the highest points as we find them in the gneiss and syenite of our mountain tops, while the coarser materials were developed in the lower extremities; the whole resting on the solid foundation of this globe. As we see the mountains rising from the sea bottom now, so mountains were formed upon the sea bed at all times. As the education of dust went on so the physical classes altered their characters. Silicious matter, mixed with vegetation, formed the second mountain ranges; upon these were deposited classes of vegetable, and as life was multiplied, the limestone formed from the remains of living organisms, was heaped up by the waters, and gathered by the winds. As the waters arranged their own classes, so we find the gneiss, the syenite, the granites, and the basalts contiguous to the formations from organic dusts.

Man has traced many of these dust deposits, he has placed the silicious gneissic and granitoid schists in the the azoic epoch; we find these at all heights, and on the sea bottom. Nature links her formations so close together, that they seem to casual observers as mere repetitions; in following on our clue we may also seem to repeat, but there are in our history and in nature classes that require the aid of the microscope. We beg attention to these classes. We cannot go through the whole series here, but we wish to show how materials of varied epochs may come together during the physical tuition of the dusts. Professor T. Sterry Hunt, in No. 114. *Geological Magazine*, p. 562, tells us that in 1827 Dr. Bigsby "found resting directly upon the ancient gneiss, a nearly horizontal dark-coloured conchiferous limestone," having sometimes at its base a calcareous conglomerate; he also found a "slaty series composed of shale and grey wacke, occasionally passing into a brown limestone, and alternating with a calcareous conglomerate in beds, some of them charged with fossils." These mixtures of matter resulting from the original deposits of dust or from the destruction, removal, and redeposit of original deposits, belong to the details of our education. We have touched upon the subject to show that, in the entire depth of dust deposits resting on the "ancient gneiss," we never find a long defined horizon of one material. So that we go on with the arrangements, that the Geological Schools have placed before us, with the understanding, that although chalk, clay, sand, slate, and granite may extend in horizontal lines for long distances, yet their foundations are laid on undulating beds, similiar to the Atantic bed, and that this undulating character is of necessity imposed upon the surface.

The palæozoic or ancient life epoch succeeds the azoic. Has not science been premature here, vegetation came before life: it is plentifully mixed with the azoic zones, and should have had an epoch to itself; it is embraced in the shales, slates, and coal-measures of this epoch, but as they form deposits separate from the siliceous schists, the conglomerates, the sandstones, and the limestones, they ought to have been separated in the index formed by man. We now come to the mesozoic, or middle life epoch, including the triassic, oolitic, and cretaceous system; all containing types of organic life; while, as shown in our heading to this chapter, the entire cretaceous system exhibits a gradually deepening sea bottom. We have already shown that this sinking of the sea bed is a result of natural laws, and while the deposits of all created forms have been laid down upon its bed for millions of years, that bed has never forgotten, up to the present moment, to offer upon shores of dry land the purest sacrifices of its silicious sands.

Under the double labour of excavation, and deposit, the next epoch, called the cainozoic or recent life, found high lands that had once been under water; they had furnished the dusts of living and growing organisms, mixed with their own torn breasts to form the wide, and still expanding plains, upon which the present systems

are up to this moment employed in forming their groups or classes under the tuition of our grand professors.

That which is done to-day has been done since the birth of dust. We see his physical education going on in the mighty waves of the ocean, in its great arteries, its tides, its eddies, and its whirlpools; we see the banks, the ridges, and the sand-ripples forming every moment. We see the winds taking up the dusts from the surface of the earth, and we find the drift and the sand dunes. All our present mountain tops were deposited by the same forces, all the different materials, according to their several epochs, were more or less liable to the system of education we have so imperfectly described, and as the waters have sunk in reciprocity with their structures, so, of necessity, the dusts have been left behind to assume the condition which we see.

Have we sufficiently cleared off the clouds from the mountain brow? Have we said enough for others to see nature as she is? Are we in a position to reply to the two questions in the early part of this chapter.—How came the dust there? Why do they rise above the ordinary level of the locality? If we have said enough, the simple answers to these questions will be sufficient. If we have left any one behind in the fog, we ask him to follow us into the next chapter. Dust, like man, has gone up the hill to come down again. The mountains, as we built them, are not like the mountains that we see. We were millions of years in their construction, millions of years have brought them to what they are. The footsteps of nature are very slow, her paths are very intricate, but she has left guides at every corner; the mountain stands up conspicuous as the great stratified sign-post of ocean's highway. They are found all round the world, from the Himalayas to the Beacon Hill on Salisbury Plain; from the Arctic to the Antarctic regions of all sizes, and of varied material, all dust.

Dust came there because he was obedient to the laws, he rose above the ordinary level because his preceptors did not forsake the laws, they taught to suit the genius of the pupil, and they left him as examples of discipline. Nature never rests; no sooner had dust developed his physical education to the utmost, than, like the human mountain climber, he was called on to come down again; his water-preceptor had retired from the scene, dust after dust rolled back to his bosom, till Mr. Rance finds out the inevitable result of the laws. "The strata of the entire cretaceous system exhibiting a gradually deepening of the sea bottom." We ask Mr. Rance and others to look at all the systems of each geological epoch, they will find that all tell the same tale. This gradual retiring of the waters has therefore left the mountains of dust gathered by the winds and the waves, to serve as girders of this earth, as the buttresses of the dry land, and to be, as long as they endure, legible sign-posts on ocean's great highway. We must loiter a moment on our mountain top; fogs will rise again. We have pointed out a new path, we ask others to try it; we do not wish to lead them into difficulties, but before they try our path, or before they object to it, we wish them to find out if dust is, if winds blow, if waters move; if they cannot discover these points we advise them not to walk upon our path; if they can see these points, we still hold out our little clue, we still follow nature's laws, we still invite those who can see to follow us.

H. P. MALET.

Reviews.

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SUN'S TRUE BEARING OR AZIMUTH TABLES, computed for intervals of four minutes: Between the parallels of latitude 30° N. and 30° S. inclusive, with variation chart, and instructions for using the tables in Danish, Dutch, French, German, Italian, Portuguese, Russian, and Spanish. By *Captain John E. Davis, F.R.G.S.*, of the Hydrographical Department, Admiralty; and *Percy L. H. Davis, F.R.A.S.*, Nautical Almanac Office. (Potter).

THIS work, which we have previously announced, is one of considerable importance to the seafaring community as a quick and a ready method of ascertaining the deviation of the mariner's compass. Its utility is thus clearly described in the preface appended to the book—"The increasing quantity of iron used in the construction of wooden ships and the increasing number of iron ships, render a ready and simple mode of ascertaining the deviation of the compass of paramount importance to the safety of a vessel, as well as to ensure a quick passage by steering exactly the course intended."

But although these tables are designed for use on ship-board, they would nevertheless be of great service to the traveller within the limits of the latitudes given, as in mapping a country a true bearing is far better and more trustworthy than one taken with the compass. He is also enabled by means of this work to ascertain the variation of his compass with facility.

A neat variation chart, printed in colours, accompanies the book.

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NORWAY.—ILLUSTRATED HANDBOOK FOR TRAVELLERS. Edited by *Chr. Tönsberg*. With 134 engravings on wood and 17 maps. Christiania, 1875.

NORWAY has now a complete guide-book, in every respect well arranged by its well-known editor, Chr. Tönsberg, and containing numerous views and maps. His descriptions of Norway are less flagrantly overdrawn than those in the German guide-books, which overflow with enthusiasm on every subject to which they desire to attract the attention of the traveller. The illustrations correspond with the text of the book: they are well and correctly executed. Any one who has not travelled in the places described, will never be disappointed, but rather agreeably surprised, on seeing the originals, and having once seen them, will perceive the difficulty in illustrating the natural beauties of Norway in miniature. The views are on a large scale, as their great beauty consists rather in their colouring than in their outline, it is difficult to convey a faithful idea of their general character. The main object of the book is to give the best possible idea of the places worth seeing on the different routes, to assist travellers in choosing the same, to inform them of the various advantages and difficulties they may encounter, and to point out the prettiest parts of the country, &c. The undertaking has demanded considerable exertions on the part of the editor, as he has been compelled to commence an entirely new work, and collect the information required from various authors, celebrated tourists, and scientific men in Norway. The maps and arrangements of the guide-book are excellent, and it is a most complete work of its kind.

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SNIOLAND, OR ICELAND: ITS YOKULLS AND FJALLS. By *W. L. Watts*. London (Longmans), 1875.

THIS little work is a description of a tour through the southern portion of Iceland, made by the author and a

friend during the summer of last year. Mr. Watts points out with truth that Iceland, from its volcanic formation, presents physical phenomena of an interesting character, and that it well deserves to be thoroughly explored by those who have the ability and opportunity to do so. We must confess that a perusal of these pages would not tempt us very strongly to linger among its barren plains and lava-covered hills. Still the scenery must at times be striking; and to travellers satiated with the beauties of the continent, its geysers, volcanoes, and other "lions," no doubt, present novel attractions. We regret to observe though that in some places the inhabitants have already learnt to charge extortionate prices. This will not conduce to the work of regeneration which the author, in a thoughtful chapter on the resources and future of the island, points out is both necessary and possible. The chief wealth of Iceland lies in its fish, wool, sheep, horses, cattle, and some mineral wealth. To develop these, capital and enterprise is much required; good roads throughout the island, and improved appliances for fishing being especially wanted. We beg to point out to those who would propose to visit the country that a useful list of the necessary articles for an outfit is given at page 167, and philologists who may be puzzled at the meaning of the title of the work will find, after reading the book through, that they reap their reward, by having "Yokulls" and "Fjalls" explained in the appendix.

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Tagebuch des Nordpolfahrers Otto Krisch. 12mo. pp. 108. Vienna, 1875.

Otto Krisch, the Engineer of the 'Tegetthoff,' is the only member of the Austro-Hungarian Polar Expedition who was doomed not to return to his native country. His body rests in a rocky cleft near Cape Wilczek, but his diary has been brought home by his commander, Captain Weyprecht, an act of piety towards the deceased which is all the more to be appreciated if we bear in mind that the members of this expedition were compelled to leave behind on board of the 'Tegetthoff' some of their most highly valued properties. This diary has now been published. It is naturally an unpretending record of facts, but gives us an amusing insight into the life on board, (the ménage on days of high festival being in no case omitted), and incidentally communicates information of scientific value. The latter will of course be superseded on the publication of a full record of the expedition. The proceeds from the sale of this little book are to be applied to the erection of a monument in Krisch's native place.

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Four Years in Ashantee, by the Missionaries *Ramseyer* and *Kühne*. Edited by Mrs. Weitbrecht. London (J. Nisbet).

The Ashantee campaign has added but little to our geographical knowledge of Western Africa. No scientific collections were made, no positions determined by astronomical observations, and this opportunity of collecting information with respect to the interior of the country was neglected. Under these circumstances the account published by Messrs. Ramseyer and Kühne will prove a welcome addition to our literature on Western Africa, though the geographical information given by them as not of very great importance. The authors of this book imprudently remained at Anum, a missionary station on the Volta, after the country had been invaded by the Ashantis, and were conducted as prisoners to Kumasi. On the march they suffered many hardships, but after they had reached the capital they were treated with considerable kindness. Their captivity extended altogether over fifty-five months, and they had thus an excellent opportunity of becoming acquainted with the customs and manners of the natives. They fully describe the revolting practice of sacrificing human beings, give us an insight into the system of government prevailing at Kumasi, and furnish much additional information with reference to the causes which led to the war, and the manner in which it was conducted by the enemy. Their book is full of interest, and will certainly repay perusal.

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The History of Protestant Missions in India, from their Commencement in 1706 to 1871. By the Rev. *M. A. Sherring, M.A.* 8vo. pp. 482. Map. London (Trübner), 1875.

The author of this work has undertaken to show historically what Protestant Missions have accomplished in India since their commencement in the beginning of the last century, and as the moral and intellectual life of the nations inhabiting our globe naturally forms a branch of geographical study, a work such as this ought not to be passed over in our pages. The author, a missionary, employed by the London Missionary Society, may naturally be supposed to be prejudiced in favour of the cause which he advocates. This is indeed the case, but when reading his record of many a life spent in unselfish labours of love, we can readily understand the author's enthusiasm, though not ourselves convinced of the necessity of converting all mankind to one form or other of Christianity. The result of these Christian missions, thus far, has not been proportionate to the vast sums of money expended upon them. In 1872, the Protestant Missions of India, Burmah and Ceylon were carried on by 35 missionary societies, in addition to local agencies, who employed the services of 606 foreign missionaries. The mission-presses in India are 25 in number, and during the ten years between 1862 and 1872 they issued 3410 new works in 30 languages, and circulated 1,315,503 copies of books of Scripture, 2,375,040 school books, and 8,750,129 Christian books and tracts. There are 85 training colleges for native ministers, and training institutions for teachers, which contain 1618 students, besides 28 training institutions for girls, with 567 students. The so-called Zenana classes, which are instructed in the houses of Hindu gentlemen, are now 1300 in number, with 1997 scholars, most of whom are adults. The whole of the missionary schools contained (in 1872) 142,952 scholars, or 60,000 more than they did in 1852. The number of communicants in 1872 was 78,494, that of converts, young and old, 318,363. These results, though not as favourable as they might be, and as they would be, our author maintains, if the European public and press of India exhibited a little more sympathy on behalf of the missions, are yet sufficiently important to enlist our attention. Mr. Sherring's book deserves to be read. It is exceedingly well written, and has nothing in common with the mawkish and servile style of many of our so-called "religious" books.

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Lettres, Journal, et Documents pour servir à l'Histoire du Canal de Suez (1852-56). Par *F. de Lesseps*. Paris (Didier).

This volume contains a vast number of letters, reports, and other documents, illustrating the early history of the Suez Canal. M. de Lesseps has certainly got through an amazing amount of work. He has overcome every obstacle placed in the way of his grand scheme, and the Suez Canal will remain a monument of his perseverance. Geographers will find but litle in this volume to interest them, but it abounds in historical interest, and illustrates the steps which were taken by M. de Lesseps to pave the way for the execution of his grand work.

Cartography.

Collins's Library Atlas.

THIS Atlas consists of 60 political, 16 historical, 14 classical, and 8 railway maps, 2 star maps and 2 astronomical diagrams, which are accompanied by about 200 pages of letter-press by Dr. James Bryce, Dr. W. F. Collier and Drs. Leonhard and Schmitz, and a copious index containing about 50,000 names. The maps have been neatly engraved, are printed tolerably well, and the entire work, bound in cloth, is sold for the remarkably small sum of 21*s*. There are many purchasers of atlases who are content with having the positions of the principal places of the world indicated approximately, and the boundary of the various countries laid down with some approach to truth. The requirements of this class of purchasers may possibly be met by this Atlas, but not so those of the more exacting portion of the public, who demand that the most recent discoveries shall be embodied in the maps, and who desire to be able to refer to them as trustworthy guides in all those geographical questions to which maps are capable of furnishing a reply. In numerous instances no record of recent discoveries will be found in the maps now before us, and the political colouring, which is indefinite throughout, frequently fails to convey a correct idea of the extent of the various countries delineated. As instances, we may mention the extent of the Russian Empire in Asia, of the dominions of Egypt in Africa, of Turkey in Arabia, and of Oman on the Gulf of Persia. The historical and classical maps are not equally open to the same objections, though they can hardly be said to illustrate the subject to which they refer in an ample manner, and the order in which they follow each other, to say the least, is exceedingly odd. The six railway maps are mere reproductions of the political maps, with some names omitted and the railways inserted in a somewhat more prominent manner. They merely increase the bulk of the volume without adding anything to our information, and in a future edition might fitly be replaced by maps of the United Kingdom, on a larger scale than those now given. The letter-press is fairly done upon the whole, though the statistics, in most instances, are more antiquated than need be, and there are several bits of curious information, such, for instance, that the "Mosquito territory forms a monarchy under British protection."

New Admiralty Charts.

ONLY a few amongst the Admiralty Charts published recently call for particular notice. Beginning our review, as usual, with Europe, we first meet with a chart of the approaches to Stettin, copied from a Prussian chart published in 1869,* but very indifferently translated. Allowing every latitude in this respect we must nevertheless object to names such as "Great See," "Anclammer Forest," and "Ostnothafen." The former ought either to have been translated in full or not at all, and a translation of the latter ought to have been added in parenthesis, for English mariners cannot be supposed to know that it means "Eastern Port of Refuge." The Bay of Biscay is represented by plans of St. Jean de Luz† from a French chart by M. A. Bouquet de la Grye (1864) and of San Sebastian,‡ from a Spanish government map (1865).

Amongst the charts referring to Africa, that of the east coast, between latitude 5° 20′ and 7° S., embracing the coast between Ras Kimbiji and the Pangani Rivers, together with Zanzibar Island and the approaches to it, is certainly the most valuable.§ It is based upon surveys made by the officers of H.M.S. 'Shearwater,' Captain J. L. Wharton, in 1873-4, and is supplemented by an enlarged plan of Zanzibar, by officers of the same vessel. To the officers of H.M.S. 'Nassau,' Lieut. F. J. Grey, we are indebted for plans of Mchinga Bay (Port Nungwa) and Kiswere Harbour on the same coast.*

Another sheet contains plans of three bays or anchorages on the south-eastern coast of Madagascar, based upon French surveys.† Lieutenant A. W. Stiffe supplies us with a valuable map of the coast of the Arabian Sea, from Maskat to Karachi,‡ which has been compiled by him from the surveys of G. B. Brucks, S. B. Haines, T. G. Carless, A. Grieve, C. G. Constable, and A. W. Chitty, supplemented by surveys made by himself in 1874. There are marginal plans of Jáshak, Gwatar, and Gwádar Bays by Lieutenant Stiffe, and of Chahbár Bay by Captain G. B. Brucks. The chart is an exceedingly valuable contribution to our cartography of Asia.

The Pacific is represented by a plan of Savu Savu Bay of Vanua Levu, one of the Fiji group, by Mr. Barracks, Master Mariner.§

Three charts refer to America. There is a plan of Port Xagua or Cienfuegos, on the coast of Cuba, from a Spanish survey of 1836,‖ and a chart of a portion of the west coast of Santa Lucia, from Captain J. Parsons' survey, made in 1863.¶ Marginal plans inserted upon the latter refer to the Grand Cul de Sac, surveyed in 1874 by officers of the 'Spartan,' Captain R. Carter, and of Marigot Harbour. The last chart to be noticed is one of the coast from Piedras Negras to Santa Lucia, and shows the approachesto Monte Video.** It is based upon the most recent surveys.

The two index charts mentioned below †† are useful supplements to the Admiralty catalogue, a revised edition of which has been issued recently.

Stanford's Orographical Map of the British Isles.‡‡

Mr. STANFORD has published an orographical map of the British Isles, which we hail as the embodiment of a great amount of conscientious labour, and trust to see introduced into every school. It is edited by Professor A. C. Ramsay, the Director-General of the Geological Survey, and does credit to Mr. Stanford's geographical establishment. The land is tinted according to height, the sea according to depth, and by these means a much clearer insight into the general relief of land and sea is obtained than where the hills are shaded in the ordinary manner. Both systems of delineating the ground have been combined on this map; and whilst the tints mark out in a striking manner the lowlands, table-land, hilly and mountainous districts, the hachured shading enables us to trace minor features, which a contoured map of this kind is incapable of exhibiting unless the contours are inserted at very small intervals. There is a marginal rain-map, very instructive, and exhibiting at a glance, the districts where the rain-fall is most considerable.*

E. G. RAVENSTEIN.

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* Baltic: Port Swinemünde and approaches to Stettin, 1:73,000. (No. 185). 3*s*.

† France: St. Jean de Luz. 1:8,100. (No. 1345). 9*d*.

‡ Spain: San Sebastian. 1:5,880. (No. 88). 1*s*.

§ Africa, east coast: Pangani to Ras Kimbiji. 1:146,000. (No. 640). 2 sheets, 5*s*.

Zanzibar Harbour and its approaches. 1:48,700. (No. 665). 2*s*. 6*d*.

* Africa, east coast: Mchinga Bay. 1:18,000. (No. 677). 1*s*. 6*d*.

Ditto, Kiswere Harbour. 1:24,187. (No. 687). 1*s*.

† Madagascar, south-east coast; Fort Dauphin, St. Lucia, and Ytapère Bays. (No. 689). 1*s*.

‡ Arabian Sea; Maskat to Karáchi, with plans. (No. 38). 2*s*. 6*d*.

§ Fiji Islands: Savu Savu Bay. 1:91,100 (No. 727). 6*d*.

‖ West Indies: Port Xagua or Cienfuegos. 1:32,100 (No. 444). 1*s*. 6*d*.

¶ W. Indies: Marigot Bay to Gros Island. 1:24,200 (No. 197). 2*s*.

** Rio de la Plata; Piedras Negras to Santa Lucia River. 1:121,666. (No. 493). 1*s*. 6*d*.

†† Index sheet for the coasts of France, Spain and the Mediterranean (E). 6*d*.

Index sheet for China: Siam and the Philippine Islands to Japan (J). 6*d*.

‡‡ Stanford's Orographical Map of the British Isles, edited by Professor A. C. Ramsay. Scale, 1:740,000. London, 1875.

Log Book.

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The Eruption in Iceland.—The steamer 'Fifeshire,' carrying the expedition intended to survey the sulphur mines of Nyvatn, in North-Eastern Iceland, left Granton on the 6th of July. The party is composed of Captain Richard Burton, Mr. J. R. Tennant, jun., Mr. German Green (geologist), and others. Efforts will be made to examine the seats of the recent volcanic eruptions which took place from the Trölladyngja and the Herthubreith. That from the latter occurred on Easter Monday, the 19th of March, covering a district of 3000 square miles, with a layer of ashes and small stones to the depth of 1½ to 8 inches. The ashes were carried as far as Norway and Sweden.

Norwegian Exploration of the Northern Atlantic. — The Norwegian Storthing has voted 4600*l.* towards an exploration of that portion of the northern Atlantic which is bounded by the Färoe, Iceland, Jan Mayen, Spitzbergen, and Norway. The exploration will extend to the fauna, flora, temperature, and the currents of the ocean; and particular attention will be paid to the requirements of the Norwegian fisheries. This enterprise is due to the advocacy of Professors Sars and Mohn. The chief command has been given to Captain Carl Willie of the Norwegian navy.

The old Bed of the Oxus.—The long projected expedition for the exploration of the Uzboi or old bed of the Oxus has at length been undertaken. The lower course of that old river channel had been explored by Radde and Siewers, and by Stebnitzki, as far as the Igdy Wells, and its upper course was traced, in 1873, by Colonel A. I. Glukhovski, from Kune Urgenj to the Lake Sary-Kamysh. The intervening portion was to be explored in 1875. The expedition, escorted by General Lomakin, left Molla-kary on the Bay of Krasnovodsk, on the 1st of June (new style?) and reached the Igdy Wells on the 20th of that month. The scientific members thence started for Sary-Kamysh, where they were to be met by a body of troopers from Khiva. According to the latest intelligence received they appear to have reached the Charyshly Wells, about 50 miles to the south of Sary-Kamysh, and thus far they travelled along an old river bed, gradually sloping down to the Caspian, and offering apparently no obstacles to the formation of a canal. General Lomakin, on his return from Igdy, reached the Jamala Wells on the 5th of July, and will thence proceed by way of Aidin and the Little Balkan to the Lower Attrek.

A Russian Geographical Gazetteer.—The committee of the statistical section of the Russian Geographical Society appointed to report on a proposition made by MM. Sobolyef and Jansson, to publish a gazetteer of Central Asia, has reported favourably on the subject. They recommend that particular attention be paid to historical geography and ethnology, as statistical data are subject to frequent alterations. The territory to be embraced by the work is bounded on the north by the watersheds of the Ural and Irtysh; on the west coast by the Caspian; on the south by the Elburz, the Hindu Kush, and the Karakorum Range; and in the east by Mongolia. The authorities for every statement made are to be carefully referred to, for future reference, and great care is to be taken with respect to the spelling. A final programme will be laid down by a joint committee of the three sections of the Russian Geographical Society.

The Altitude of Lake Aral.—A careful barometrical levelling between the Caspian and Lake Aral was effected in 1874, by MM. Solimani and Moshkof, under the direction of Colonel Thilo. Assuming the Caspian to be 85.6 feet below the level of the Black Sea, Lake Aral would be 243.1 feet above it according to M. Solimani, and 242.45 feet according to M. Moshkof, the mean being 242.77 feet above the Caspian, or 157 feet above the Black Sea. The chief results obtained are as follows:—

Place of Observation.	Distance from the Caspian. Geog. miles.	Depression or height above the Black Sea. Feet.
Caspian Sea	—	− 86
Mertvii Kultuk, Caspian	—	− 53
Yaman-Turlu	43	+321
Uch-Kuduk	68	+286
5 m. south of Lake Sam	80	+282
North edge of sandy desert of Sam	85	+288
Jar Kuduk	91	+275
2 m. south of Armantai-matai Lake	144	+253
Koz-Kuduk, 6 m. S. of Koz-bulak Lake	150	+311
Culminating point	191	+709
Bai Kadam, well	200	+681
Kara Tamak slope	210.8	+279
Lake Aral	211.4	+157

Hitherto the height of Lake Aral above the sea had been supposed not to exceed 27 feet.—*(Verhandl. der Ges. für Erdk).*

The Pei-hwa-shan* near Peking.—Dr. Bretschneider, the physician attached to the Russian embassy at Peking, paid a visit to the Pei-hwa-shan, a celebrated mountain at a distance of three or four days' journey to the west of Peking. This mountain is not to be found on any of our maps, not even on that of the province of Chi-li, published in 1871, by K. Weber. It rises to an altitude of 8000 feet, and is indebted for its name—the mountain of 100 flowers—to its exceedingly rich flora. Deep valleys separate it from the main mountain chain. Its summit forms a plateau 8000 paces in length and 200 wide, and an old monastery, dedicated to the mountain-deity, occupies it. When Dr. Bretschneider visited the mountain in May, the first signs of spring were just appearing, but several parts were still covered with snow. The prospect is magnificent; the surrounding mountain slopes are covered with woods; towards the west, at a distance of 70 miles, snow-covered mountains rise on the horizon; and at a still greater distance towards the east, the fertile plain of Peking, tinged in green and yellow, is perceived. In spite of the early season Dr. Bretschneider collected about fifty plants in bloom, which were submitted to Dr. Hance, the English Consul at Bampu, near Canton, who discovered eight entirely new species amongst them. A red primrose *(Primula oreocharis*, Hance) would prove an ornament to our gardens. The birch (in three species), poplar, maple, walnut, and larch grew on the mountain, and a new species of apple *(Pyrus Bohuashanensis*, Hance) was discovered. A botanist, who made a stay here from May to September, would certainly be able to collect several hundred species of new plants. Excursions might easily be made to neighbouring mountains, each

* We adhere to Richthofen's mode of spelling. The Russians write Bo-hua-shan.

of which appears to have a flora peculiar to itself. (*Istvyestya* XI.).

Explorations in Tibet.—The head Pandit at the Great Trigonometrical Survey has done an admirable piece of new work, having explored a more northern route from Lhadak to Lhasa than any yet Surveyed. From Lhasa he explored a new line which strikes the Brahmaputra at a much lower point in Tibet than has yet been reached, and then goes southards into the Assam Valley.

Herr Marno has just communicated to the Vienna Geographical Society an account of an exploring trip made by him between January and March, about 150 miles to the south-west of Lado, the new head-quarters of Colonel Gordon. He penetrated to the Makraka country and got a sight of the mountains which Dr. Schweinfurth had seen eastward from the Gebel Baginze Mountain. His furthest point was Seriba Wania, in the Mora country, at the confluence of the Jei and Thore. He considers that he has established beyond a doubt that the Jei is the upper course of the Rohl River. The sources of the Jei he had not an opportunity of visiting, but from native information, he inclines to think that it has numerous head-streams, which would appear to rise in the mountains north of the Albert Nyanza. The inhabitants are smaller and of a lighter colour than those to the north by the Bahr el Abiad, and this change is one that cannot fail to impress the traveller as he journeys south. Herr Marno inclines to the general belief that Dr. Krapf's dwarf tribes, Du Chaillu's Obongo, and Dr. Schweinfurth's Akka tribes (with which the natives met by Marno are no doubt identical) form the aborigines of Central Africa.

A German Abyssinia Company.—Mr. Woldemar Reugé, who has lately returned from Shoa, where he stayed for two years and a half, the honoured guest of King Memelek, has founded a co-operative society, with a view to the establishment of a German colony at Ankober, the capital of Shoa. Each member is required to pay down 150*l.*, and to devote the whole of his time to the company for at least three years. Profits, if any, will be equally divided. The applications for membership have been exceedingly numerous, and the first detachment, consisting of twenty members, will start from Berlin in September. Commerce is naturally one of the main objects of this association, but it has likewise undertaken to organize the military forces of the king, to supply them with arms, to construct roads, and to import mechanics. The exploration of the interior of Africa is enumerated amongst its objects. The Austrian Lloyd steamers will call once a month at Obok, at the mouth of Tajurra Bay, and regular communication with Europe will thus be established.

Exploration of the Ogowai.—Dr. Lenz has written to Dr. Von Hochstetter, under date Gaboon, April, 1875, and furnished an account of his doings since his arrival in Africa in June last year. He first examined the Muni River (which debouches on the first parallel of north latitude), and three of its tributaries, and subsequently visited the Como River, which is the chief stream discharging itself into the Gaboon Bay. At both places he found a tribe called M'pangwes or Fan, who live in a primitive state; are armed with shields, cross-bows, and poisoned arrows, and are much dreaded on account of their cannibalistic propensities. Both of these rivers appearing too insignificant to offer a good opportunity for penetrating inland by them, Dr. Lenz commenced to explore the Ogowai in August last, and ascended as far as the mouth of the Ngunie; and after that, in October, penetrated as far as the Okanda Country, 12° E. long. Among a variety of tribes, he came across some of Du Chaillu's dwarf Obongos. Dr. Lenz has assured himself, both from personal observation and from enquiry, that the Ogowai offers a good highway for inland exploration. He proposes accordingly to ascend the river eastward as far as possible, and then to work northward. He states, in conclusion, that he has succeeded in procuring, and has shipped to Hamburg, a pretty good specimen of a live gorilla.

According to the most recent tidings, Herr von Homeyer and Herr Soyaux were to have started in May last from the south coast of Loanda; Drs. Güssfeldt and Pechuel-Losche from the coast north of the Congo, and Dr. Lenz up the Ogowai.

Mr. R. B. N. Walker is on his way home from the Gaboon, after just completing a quarter of a century's residence and business connections with Western Africa. His main object, we understand, besides recruiting his health, after ten years' continuous residence, is to publish a work on the Geography, Anthropology, Natural History, and Commerce of Gaboon and its neighbourhood, and the other colonies and settlements on the West Coast. Few have accumulated more stores of information, and are so thoroughly versed in the native dialects and trade; and he is, therefore, fully competent to give trustworthy and novel information.

Ernest Giles's Exploration of the Interior of Australia.—We have already announced Mr. Giles's return to Finness Spring. The following telegram contains more ample details respecting his explorations:—"On March the 24th left Youldeh, which lies 135 miles north north-west from Fowler's Bay; Mr. Richards obtained for me a native guide, who knew the country some distance east. He took us first to Pylebung (64 miles), an extraordinary native dam, and a clay tank, with clay circular wall 5 ft. high round it. It is a most astonishing thing, considering that it is the work of the aborigines. Thence to Whitegin—a small rock-hole—30 miles. Thence nearly north-east we reached Wynbring, a fine rock-hole in the crevice of granite rock, which stands about 50 ft. high, and is 2 or 3 acres, perhaps, in extent. Youldeh, Pylebung, Whitegin, and Wynbring are all in the densest of dense scrubs, heavy red sand-hills, with thick mallee, mulga, acacia, grevilles, casuaxina, hakea, and spinifex; the dead underbush so thick that the camels could scarcely move along. Wynbring was 100 miles from Youldeh, and lying 10° south of east from it. From here the guide knew the country no further, and declared that beyond this point there was 'nothing, nothing.' Leaving Wynbring we came 220 miles through the most terrific scrubs, with an open streak of 30 miles between, to a claypan with water in, and that saved us. The three horses died of thirst, one at 65 miles, one at 150, and the last at 168 miles. The camels carrying water, we gave the horses as much as possible, till we were reduced to three pints. The heat was great, the thermometer day after day standing at 102° in the shade. It was

impossible to travel at night, as we should have left every eye on sticks in the scrubs. The 220 mile stretch from Wynbring to the claypan was done in eight days, the camels averaging 28 miles per day. They are wonderful, awe-inspiring, and marvellous creatures. I never praised God so much for anything before, and for such creatures I thank you and praise Him. Having found water, our progress in was easy, each walking and riding by turns. I just touched upon the edge of Lake Torrens. From what I have seen I judge that there exists a vast desert of scrub of a triangular form, the base of which is at or near the western shores of Lake Torrens, and the sides running north-westerly from the southern foot, and most probably west from the northern cone to an apex at no great distance from my starting-point, Youldeh, and I think a line north from Youldeh would pass through it in but a short distance. The way I came was nearly along its greatest length. It consists of two deserts, divided by a strip of open country, about 30 miles broad. The western and denser one I have named Richard's Desert, in gratitude to Mr. Richards for his own and his native's guidance; and the eastern one I have called Ross's Desert, as it was that that baffled Mr. John Ross, who got through the eastern, but never entered the larger western one. I shall hasten to Beltana, and am quite confident of the successful issue of the expedition."

Macleay's Expedition to New Guinea.—Mr. William Macleay sailed from Sydney on board the barque 'Chevert,' fitted out at his own expense, for the purpose of exploring the coast and rivers of New Guinea. He is accompanied by Captain Edwards, Captain Onslow, R.N., two naturalists, Messrs. Masters and Brazier, and three collectors of specimens of natural history. The 'Chevert' carries a steam launch 36 feet long, in which it is proposed to attempt an ascent of the Fly River.

Fiji Islands.—The measles imported by H.M.S. 'Dido' have carried off from one-third to one-half of the native population. On Ovalau, out of a population of 1500 natives, no less than 507 died (up to 24th of April last), and the disease spread thence over all the larger and smaller islands of the group with frightful rapidity. In the mountains of Viti and Vanua Levu it has annihilated whole tribes. The population of the Windward Islands has been decimated. The ravages of the disease have been unnecessarily aggravated by the disinclination of the natives to submit to medical treatment, and from their belief that it was imported intentionally, in order to destroy them. The principal chiefs, a majority of those who signed the deed of cession, have fallen victims to it. An occasional correspondent of the *Times*, estimates the present population of the group at 1200 whites, and 60,000 to 70,000 natives.

The material condition of the new colony is full of promise for the future, though the low prices of cotton in England, coupled with the disaster wrought by a terrific gale of wind on the 8th of January, and the ravages of the measles, have produced a state of commercial prostration. The cultivation of sugar is only in its infancy, but the results thus far are exceedingly satisfactory. Sea-island cotton has been replaced in many instances by maize, which yields three crops, each of 30 to 50 bushels per acre, in the course of thirty-four months. The plantations of coco-nuts are being extended, and coffee plantations have also been laid out. The imports for the three months ending the 31st of December 1874, amounted to 31,545*l.*, the exports to 27,586*l.*, the latter (including 525 bags of beche de mer, 1861 bags of copra (kernels of coco-nuts), 10,000 coco-nuts, 1883 dholes fibre, 86½ tons of coco-nut oil, 434 tons and 724 bags of cotton, 6 cases of tortoise-shell, 10 tons of sandal-wood, besides small quantities of beans, sugar, pea-nuts, tallow, hides, timber, and wool.

The Mean Height of the United States.—The 3rd edition of the "Lists of elevations principally in that portion of the United States west of the Mississippi River," by Henry Gannett of the United States Geological Survey of the territories, carried on under the efficient direction of F. V. Hayden, not only contains lists of numerous altitudes, but likewise an estimate of the mean elevation of twenty states and territories. The results obtained by Mr. Gannett are as follows:—

	Feet.		Feet.
Washington	1800	New Mexico	5400
Oregon	2700	Dakota	1950
California	2800	Nebraska	2550
Montana	3950	Kansas	1780
Idaho	3800	Indian Territory	1250
Wyoming	6450	Texas	1870
Nevada	4900	Minnesota	1050
Utah	5100	Iowa	925
Colorado	6600	Missouri	800
Arizona	4200		

The area of these states and territories amounts to 2,126,101, and their mean height has been computed by us, from the figures given by Mr. Gannett, at 3130 feet. Spread uniformly over the whole of this area Colorado contributes 313 feet, New Mexico 309 feet, Montana 267 feet, Nevada 258 feet, California 246 feet, Texas 240 feet, &c. We shall probably not be far wrong if we assume the mean height of the eastern portion of the United States (900,393 square miles) to amount to 800 feet. The mean height of the whole of the states would consequently be about 2470 feet. That of Europe has been computed by Mr. Leitpold at only 974 feet (see *Geographicvl Magazine*, 1875, p. 185).

Obituary.—Sir WILLIAM E. LOGAN, F.R.S., late Director-General of the Geological Survey of Canada, died last June, at Pembrokeshire, at the age of 77 years. The deceased was born in Montreal in 1798, but received his education at the High School and University of Edinburgh. At the age of 20 he entered the commercial house of an uncle in London, but devoted all his spare hours to geological science. His earliest publications refer to the coal-fields of South Wales and the West of England. In 1841 he visited the coal-fields of Pennsylvania and Nova Scotia, an account of which he rendered to the Geological Society of London, and in the same year he communicated an important paper on "The Packing of the Ice on the St. Lawrence, and on the modern deposits of the valley of that river." In 1842 Mr. Logan commenced an examination of the palæozoic rocks of Canada, and in the following year he accepted the post of Director-General of the Geological Survey instituted by the Colonial Government. In that office he rendered great service to geology and geography, in recognition of which he received the honour of knighthood in 1856.

GENERAL W. H. DUFOUR, chief of the Swiss General Staff, died on the 14th of July, at Geneva, at the ripe age of 88. To geographers he is best known by the magnificent topographical maps of Switzerland, which were brought out under his direction.

LADY FRANKLIN, the wife of the Arctic navigator Sir John Franklin, died on the 18th of July, at her house in Phillimore Gardens, aged 83.

Correspondence.

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MR. SKERTCHLY ON THE OGOWE.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—I write to correct some mis-statements which appeared in the *Academy* of May 1st, regarding a journey of exploration in Equatorial Africa, alleged to have been made in 1868, by Mr. J. A. Skertchly.

In the first place, I declare most positively that Mr. Skertchly was not in Gaboon at all in 1868; and secondly, I deny that he made any journey of exploration in the Gaboon and Ogowé either in 1868 or in any other year. In proof of these assertions I will state a few facts, leaving Mr. Skertchly to refute them if he is in a position to do so.

In January 1870 the barque 'Oriole' was loading in Liverpool a cargo consigned to myself for trade on the West Coast of Africa, and Mr. Skertchly, who was employed by some gentlemen in England to proceed to Gaboon for the purpose of collecting bird-skins, and other specimens of natural history, applied to the owners of the vessel to be allowed to take his passage in her, but his request being refused, he proceeded by mail steamer to Fernando Po, from which place he obtained passage to Gaboon in the schooner 'Maria,' Captain J. E. Holt, on the strength of letters of introduction to me from Mr. H. W. Bates, Assistant-Secretary to the Royal Geographical Society, Mr. R. B. Sharpe (now of the British Museum), and Mr. E. Higgins, the well-known natural history agent of 24, Bloomsbury Street. Mr. Skertchly arrived in Gaboon in February 1870, and (in my absence) obtained a footing in my factory at that settlement, somewhat against the will of my representative, who suggested, but unavailingly, the propriety of the letters of introduction being first presented to me, and my sanction obtained by the bearer to take up his residence in the establishment. Mr. Skertchly seemed in no hurry to make my acquaintance; but as I was informed that he was going out to Gaboon, that he was to receive a grant of 400*l.* from the Royal Geographical Society, and was authorised by the Council to demand from me the instruments lent me by the Society in 1865, I at once wrote to Mr. Bates to make enquiries, and was informed in reply that the Royal Geographical Society had neither granted any money to Mr. Skertchly nor intended doing so, and that he was not empowered by the Society to receive from me the instruments in question.

After much persuasion, Mr. Skertchly acceded to the request of my factor in Gaboon, and came round to see me at Eloby. During his brief visit to me, I spoke to Mr. Skertchly of my journey to the Ogowé in 1868, and of the information I had there obtained from the natives as to the upper course of that little-known river, on which he has probably founded his account of his imaginary exploration. From Eloby he returned to my factory at Gaboon, where he remained some little time longer, until the gentleman in charge, Monsieur G. Jobet, insisted upon his quitting it. He shortly afterwards obtained a passage to Fernando Po in the schooner 'Janette,' and thence returned to England by mail steamer, without having in any way "explored" the country.

During the few months of Mr. Skertchly's stay in Gaboon, he made a few trips up the river in the schooner 'Eloby,' attached to my factory, and that was the full extent of his "explorations." On these occasions he was never more than a few miles away from the vessel, nor did his absence from the factory ever exceed fifteen to twenty days; in fact, he was nearly always in the company of the master of the schooner, who being engaged in trading with the natives, could not leave his ship for any length of time. It is utterly untrue that Mr. Skertchly penetrated to 15° E. longitude, or even crossed from the Gaboon to the Ogowé, as I am the only Englishman who has yet accomplished the latter not very important feat, which I did in February 1866, having been preceded some time before by MM. Genoyer and Serval, of the French Navy. Quite recently, my friend the Rev. Dr. Nassau, of the American Mission, has crossed *from* the Ogowé *to* the Gaboon. In 1866 I ascended the Ogowé to about 11° East longitude, and in 1873 I succeeded in reaching nearly 12° E. being the first European to attain the rapids, which I did, not only on the main stream of the Ogowé, but also on its affluent, the Ngunié. In 1874 MM. de Compiègne and Marche explored the Ogowé some distance beyond the spot at which I was compelled to turn back from want of time to proceed further. Those gentlemen made important discoveries, and penetrated to about 12° 40′ E. longitude, where their further progress was barred by the hostility of the natives: that is the farthest point yet attained by Europeans, and for which journey MM. Compiègne and Marche have recently been awarded a medal by the "Société de Géographie" of Paris. At present two German travellers, Dr. Lenz and the Baron von Koppenfels, are engaged in exploring the Ogowé, as is also Dr. Nassau; and I believe that a French officer, Monsieur Savorgnan de Brazza, is about to undertake an expedition for the same purpose, so that something more will shortly be known of the upper course of that important but long-overlooked river, which very possibly has some connection with the Lualaba, and almost certainly proceeds from one of the vast central lakes. Mr. Skertchly is not, however, likely to give us much information on the subject, all that he can tell being mere hearsay.

Messrs. Bates, Sharpe, and Higgins will, I am sure, if asked, confirm my statement as to the year of Mr. Skertchly's abortive visit to Gaboon; they can also, probably, tell where he was in 1868. I can likewise refer to Messrs. Holt, of 7, Dale Street, Liverpool, and of Fernando Po and Gaboon, as well as to numerous other persons, if necessary, to confirm my contradiction of the glaring mis-statements concerning Mr. Skertchly, which I venture to characterise as a gross attempt to impose not only on the *Academy* but on the public. As I hope to be in England in the course of a few weeks, I shall then be prepared to maintain the correctness of what I now write.—Yours, &c.

R. B. N. WALKER, F.R.G.S.,
Membre Donateur de la Société de Géographie de Paris.

FUNCHAL, *June 10th*, 1875.

P.S.—If Mr. Skertchly had really made so important a journey under the Equator as he pretends to have done in 1868, how does it come to pass that he has for so long a time hidden his light under a bushel? Why did he not make his discoveries known to the Royal Geographical Society, and to the world at large? There was no such delay in publishing his Dahomey experiences, and surely the fact of having penetrated to 15° E. longitude, in an entirely unknown region, and of having there made such important discoveries as the existence of Arabs (!), and the possibility of passing from the Ogowé to the Congo by boat, was more new and interesting than descriptions of Dahomey court ceremonies, &c. Where did Mr. Skertchly obtain his instruments, and when did he learn their use, so as to determine the longitude so accurately?

R. B. N. W.

Proceedings of Geographical Societies.

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ROYAL GEOGRAPHICAL SOCIETY.

Meeting of June 28th, 1875.

WESTERN AUSTRALIA.

SIR HENRY RAWLINSON took the chair at 8.30 P.M. The first paper of the evening was by Mr. John Forrest on his journey across the Western Interior of Australia. He first gave a sketch of his former journeys, the first of which was undertaken in 1869, with the object of exploring eastward and discovering some trace of Leichhardt's remains (in the course of which journey he reached latitude 28° 41′ S. and longitude 122° 50′ E., but without finding any trace of the lost party), and in the second of which, in 1870, he journeyed round the Great Bight, an exploit which has led to the construction of a telegraph line, connecting Western Australia with the telegraph system of the world. His most arduous task was his last one. Just before commencing it he had received a brief account from the Surveyor-General of Western Australia of Colonel Warburton's expedition, which did not cheer him much, especially as the Colonel had been supplied with camels which can go for ten or fourteen days without water, while horses, of which he had only a very ordinary lot, require water every day. On the 1st April, 1874, the expedition left Champion Bay. Mr. Forrest's account of his progress thence was as follows :—

I was very sanguine of being able to accomplish what I had undertaken, but never expected to encounter such obstacles and difficulties as we afterwards did. I had no idea of any such large extent of country so utterly wretched. We reached Mount Hale, the farthest point known on the Murchison River, without much difficulty, and had a very pleasant time until we reached the watershed of the river in longitude 120°.

Travelling on, along grassy alluvial flats, with nice pools of water here and there, with ducks numerous and kangaroos plentiful, we thought we were going to have a splendid journey, and little knew what was in store for us on the other side of the watershed. I had anticipated finding a river running to the east; but when we arrived at the watershed, which I named the Kimberley Range, I found it was only a low rise, with a few dry watercourses leading from it, and, instead of a river running to the east, we had not gone many miles before we entered a spinifex desert, which lasted, without any break worth mentioning, for 600 miles.

Most of you present may have heard of the spinifex desert, and I will try to explain what it is like. As far as you can see in every direction stretch plains of apparently ripe corn, which is the grass or stalk growing out of the spinifex tufts. Spinifex is very sharp, and on that account is commonly called Porcupine Grass: it is the *Festuca irritans* of botanists. The grass is very disagreeable to walk through, and often makes the horses' legs bleed: when dry, horses will not and cannot eat it; the grass or stalk is so dry, and entirely without nutriment. Day after day, week after week, and for months, we fought against it; and in this fearful country, whichever way we turned, all was the same. A few grassy valleys of very small extent were sometimes crossed. One of these, in latitude 25°, longitude 121° 21′ E., in which we discovered a magnificent spring, named by me the Weld Spring (after our Governor, who has been such a great supporter of exploration), is a very delightful spot. Abundance of water, game of every description, kangaroos and emus numerous, and pigeons innumerable; it certainly was a delightful break in the frightful monotony of our journey, an oasis in the desert. We were obliged to halt here three weeks, while we searched for water ahead; during the time we were attacked by fifty or sixty armed natives, and were compelled to fire on them. There were only four of us at camp when they attacked us. On two other occasions during our journey we were attacked; the first by about twenty, and the last by about a hundred natives. Each of the three times we had to fire on them; and although some were wounded, as far as we know, none were killed. We were now in the very heart of the desert; great care was necessary in moving on, and our horses were getting very poor. Our course of procedure was as follows :—

Myself and a native would leave camp where there was water, and go ahead in search, leaving instructions for my brother to follow with all the party, one, two, or three days after us, as we thought expedient. Should we find water, we would rest until he overtook us, as he would follow our horses' tracks, and this would save us the trouble and labour of returning to bring them on. On the other hand, if we were unsuccessful, we had sufficient time to return and meet them before they got into any serious difficulty. On many occasions we found enough for our own two horses, but not sufficient for the main body of the party.

Our daily life during the six months we were away from civilization was as follows :—We had breakfast before daylight, being awakened by the man on watch (one always kept watch regularly in turns, two hours each), who would have the tea made if there was any water. At peep of day four of us went to collect the horses, which were often a long way off, leaving two at camp to pack up and get everything ready for saddling. As soon as the horses were collected, we saddled up and continued on. We had to walk in turns the whole way, as our horses were too poor to carry us, the whole distance being nearly 2000 miles.

It would serve no good purpose my giving you a more detailed account of our troubles and labours in this miserable country; suffice it to say we got through it by the middle of August, and sighted the hilly country ahead that had been formerly visited by Mr. Gosse and Mr. Giles. Up to this time we had only lost two of our horses; but before we reached the Telegraph Line, owing to heavy travelling and scarcely any food, our losses were six. One poor old horse bore up wonderfully until within sight of the Telegraph Line, when he fell down and died in less than a minute: he died in harness like a good soldier.

The season was one of such great drought that, as soon as I got fairly on the tracks of the South Australian explorers, I determined to lose no time in reaching the settled districts. No rain had fallen since Mr. Gosse was here the previous year, and we had considerable difficulty in many places, owing to the water being dried up, and our depending too much on expecting to be able to stay where he had stayed. However, by continually moving on, we reached the Telegraph Line on the 27th September, and the Peak Telegraph Station (which is 636 miles from Adelaide) on the 30th.

We had about 60 lbs. of flour remaining, having finished everything else, and had abandoned about 300 lbs. of flour besides all the baggage we could possibly do without. We had been living chiefly on bread and water for about a month, except when we were fortunate in shooting game.

All our troubles were now over: we travelled down slowly towards Adelaide, and had quite a triumphal march all through South Australia. On our return to Western Australia we were received with much enthusiasm.

The natives we met with were very similar in habits and appearance to all others I have seen in different parts of the interior of Australia. They are entirely without clothing, and sleep with a fire on each side of them, without any hut, unless in very wet weather, when they make a very poor shelter with wood and thatched with grass. There are a good many of them even in the worst spinefex country, in which much wallaby exists. It may be thought by many that there must be

plenty of water where there are natives, but it is not so. A native does not wash or cook with water, all he uses it for is to drink; therefore a small rock-cavity, with say from 20 to 100 gallons, will suffice a long while for a number of them, and they cover it up to keep it from evaporating; but that quantity goes a very little way with fifteen or twenty horses. The natives, again, know every little waterhole and spring; whereas we had to look for it, and might sometimes pass it. I have no doubt that there are no parts of Australia, or scarcely any, that you could not travel over easily if you knew every watering-place; but an explorer has to find all these places, and hence the difficulty. With us the guide to water was the encampments of the natives, the tracks of emus, and those of the natives themselves; the flight of birds, such as pigeons, especially in the evening, was also an indication. Emus, however, I think were our best guides, as they are birds which must have water regularly. The natives sometimes go a long distance away from water, and get it from the roots of a species of Eucalyptus, called Mallee Scrub. They choose the roots, break them in lengths of about a foot, and stand them on end, when all the moisture drains out into a wooden dish. The traveller meets with great heaps of these roots, and it is a bad sign when in search of water.

Regarding the character and capabilities of the country we travelled over, it should be remarked that a great deal of the country from the west coast to the watershed of the Murchison is admirably suited for pastoral settlement, and is already being taken up and stocked; but after crossing the watershed as far as longitude 128° E., I do not think it will ever be of much use. The whole of this immense tract is a slightly undulating spinefex desert, and the prevailing rock is the tertiary desert sandstone. From longitude 128° to the Telegraph Line the country is in many places beautifully grassed, and most of it has been taken up already by the South Australians. But, perhaps, the greatest result of the expedition has been the addition to our geographical knowledge of the country. The western half of Australia has now been traversed from east to west, through the centre along the 26th parallel, and all theories as to the nature of the interior of the vast continent are finally set at rest.

As regards the future exploration of Australia, there is comparatively very little more to be done: all the geographical problems have now been finally solved, and the only remaining portion of interest is the small part in the north-west corner from Roebuck Bay to the Victoria River. This would be a very interesting expedition, as there are some fine rivers to be examined, amongst them the Fitzroy and the Glenelg. You would be certain of having good country to travel through, and would most probably accomplish all you would set out to do, viz., to examine all the country to the west of the watershed of the rivers running into the sea. In my opinion, this is the only part of unexplored Australia that is worth examining. I am sorry to see the energy of Mr. Giles, under the auspices of Mr. Elder, of South Australia, almost thrown away in examining a country, the character of which is tolerably well known, between the explored portions of South and Western Australia, keeping to the south of latitude 30° S.

Australian discovery has made very rapid strides within the last few years, and I feel convinced the day is near at hand when the whole of the available country of Australia will be occupied and stocked.

Sir G. BOWEN said that, having been for eight years Governor of Queensland, which occupies on the eastern coast of Australia a position similar to that of Western Australia on the opposite coast, no one could appreciate more highly than he did the service rendered by Mr. Forrest to the colonies. When he first went to Queensland some 500 miles of coast only were settled, *i.e.*, from Brisbane to Rockhampton; but now a chain of flourishing settlements extended 1200 miles further up, to the Gulf of Carpentaria. Queensland was richer in coal, iron, and gold than Western Australia; but this latter colony had also many advantages, and might ultimately attain the same success as Queensland had already arrived at.

Mr. LEAKE (Speaker of the House of Representatives, Western Australia) enumerating the important explorations in which Mr. Forrest had been engaged, said that his first journey to Lake Barloe, in search of the remains of white men reported to exist there, and supposed to be those of Leichhardt and his party, quite settled that question, and proved that Leichhardt had not passed that neighbourhood. On his second expedition he accomplished the great feat of travelling from King George's Sound along the coast of the Great Bight to South Australia. In this, as in previous undertakings, he did his work well, and rendered great service to geography and to the colony. His discoveries had led to a large portion of the country being settled, and the neighbourhood of Eucla in the Bight was now largely stocked, the only difficulty being the want of water; but no doubt, as in other parts, permanent springs would be found when settlements were established. By his last expedition from Champion Bay to the Telegraph Line at Peake Station he had also done good and useful work. He had travelled with his brother and four assistants, two of them being natives, and twenty-one horses, right across the sandy desert, and thus accomplished a journey which had scarcely ever been surpassed. The result of the expedition was to show that nothing could be hoped for from the central districts. However, on the boundary of the Telegraph Line of South Australia, and on the west coast after leaving Champion Bay in a north-easterly direction, there was a large quantity of good land which was now being taken up, and afforded as fair a field for settlement as any other in the colony, if people would only go there with energy and capital; and indeed he believed West Australia might be made to surpass both South Australia and Queensland. In the neighbourhood of Champion Bay was the Murchison River, and a little south of that the Irwin. The whole of that country was one mass of minerals, and sooner or later must become very valuable. The district of Shark's Bay abounded in pearls, many thousand pounds' worth being sent to England annually. The shell, however, was not very valuable, the mother-of-pearl being so small; but farther north, near Exmouth Gulf and Nicol Bay, the most magnificent pearls and pearl-shells were found. These were collected principally by Malays employed by colonists, the shell being worth upwards of 300*l.* a ton. The exports of West Australia had doubled during the last three years, and the imports had increased proportionately.

Mr. TOMKINSON said that he, as a South Australian, could endorse all that Mr. Leake had stated with regard to the capabilities of West Australia.

Mr. DAINTREE, referring to the desert sandstone which was so abundant in the districts traversed by Mr. Forrest, said he had seen the outliers of that sandstone throughout a large part of Queensland, and he was satisfied that during the Tertiary epoch almost the whole of that colony had been covered with it. Had it not been for the denudation caused by the rivers running east and north, there could be no doubt that at the present time it would still be a desert, similar to that passed over by Mr. Forrest.

His Highness the Sultan of Zanzibar and suite, accompanied by the Rev. Dr. George Percy Badger, Dr. J. Kirk, H.B.M. Consul-General and Political Agent, Zanzibar, and Clement Hill, Esq., entered the hall amid the acclamations of the audience.

The PRESIDENT said, I have now the pleasure of introducing to the Society the Sultan of Zanzibar. He has been an honoured guest everywhere in England, as you know, but in no place is he more welcome, I am sure, than in the Royal Geographical Society, he having been an Honorary Member of our Society for several years, and having also on all occasions, whenever an

opportunity occurred, conferred upon us very essential service in forwarding geographical research. It was owing to his Highness's assistance that we were able to send our Relief and Search Expedition for Livingstone into the interior of Africa, and on every occasion he has shown the utmost good will and energy in assisting us. I would only further remind you, ladies and gentlemen, that the friendship of the Seyyid's family with England is not a thing of yesterday. It was in the first year of this century that Sir John Malcolm made his first treaty with the grandfather of the present Sultan, and from that day to the present, throughout the long fifty years of his father's reign, the family has always behaved with the most unswerving loyalty to the British Government. His Highness has shown the utmost desire not only to further the political interests of England, but also to protect trade; and latterly, as you are aware, to facilitate the measures which we have thought it proper to introduce for the suppression of the slave trade. On all these grounds his Highness Seyyid Burghash certainly deserves well of this country, and especially of the Society of which he is an Honorary Corresponding Member. And let it be remembered that the Geographical Society is, I believe, the only society in England which has the honour of having his Highness enrolled amongst its members. I had hoped that Sir Bartle Frere, who was lately sent out by her Majesty as Envoy to his Highness, would have been present; but as he has been unavoidably detained, I will ask General Rigby, who for many years was Political Resident at the Court of Zanzibar, briefly to point out upon the map the situation of that country and to give you in a few words the result of his experiences.

General Rigby pointed out on the map the portion of East Africa ruled over by the Sultan of Zanzibar. He said that it entirely depended upon the good government of Zanzibar whether the interior of East Africa should be civilized, and its trade opened or not. The Zanzibar dominions extended from about 2½° N. to 10½° S. A number of large rivers flowed through it, such as the Pangani, the Rufigi, the Juba, and others, and opened up communications with the interior. Probably there was no part of the world that had a richer soil or was better adapted for trade than the east coast of Africa, and it was entirely owing to his Highness Seyyid Burghash and his predecessors that this country was now settled and comparatively civilized. Its trade was increasing and becoming of greater importance to Europe year by year. For many staple articles of trade Europe now depended almost entirely on the Zanzibar dominions. These dominions had the largest trade in ivory in the world; they supplied all the carriage-varnish gum-copal, of which there was an inexhaustible supply; and almost the entire supply of cloves in the world came from Zanzibar, although it was only recently that cloves had been grown there. Before they were cultivated there, cloves cost from 2*s.* to 4*s.* per pound, whereas now they could be bought for 4*d.* or 5*d.* Within the last ten or fifteen years a vastly increasing trade has sprung up in gums, spices, sugar, cotton, grain, and various other articles; in fact, there was no limit to the production of the Zanzibar dominions. His Highness Seyyid Burghash had done all in his power to open up the country, and would still continue to do so, to his own benefit and the benefit of the world.

Dr. Badger then read the following translation of the reply to the President's greeting, which his Highness had placed in his hands:—

"Mr. President, my ladies, lords, and gentlemen,—

"Our gratification overflows at meeting this honourable assembly, and we thank you heartily for the generous welcome which you have given us, and which we ventured to anticipate from your famed courtesy. We have heard wonderful accounts of the proceedings of this Royal Society in all parts of the world; but we have also ourselves seen and known much, and learned more, from our beloved friend, John Kirk, of its explorations of Eastern and Central Africa, especially through their distinguished and indomitable explorers, Burton, Speke, Grant, Livingstone, Stanley, and Cameron, who braved many and great dangers in order to make known to the world what was before unknown respecting the land of the Great Lakes, and who have given us correct information of those parts which, albeit reckoned under our rule, we knew little of except by untrustworthy report. There can be no doubt that these researches will lead the way to many advantages, and will result in the eventual civilization of those large districts, and the extension of commerce, to the benefit of all concerned. In our little way we have endeavoured to forward these researches in the midst of great difficulties, which have not always been appreciated. All we would now say is, that we have done what we could, and that by the aid of God in the first place, and next through emulation of what we have seen in this country, stimulated thereto also, by what we see before us this evening, and particularly because we have been honoured by having been made a member of this Royal Society, we shall do our best, God helping us, to further its useful objects. Several Arabian poets have dilated on the advantages of travel; and since our arrival in England we have been convinced of the truth of their statements. This Society, by making generally known the peculiarities and productions of different countries, together with the habits and customs of their inhabitants, must contribute largely to the instruction, the pleasure, and the benefit of mankind at large. We desire once more to reciprocate your kindly greeting, and to express towards you all whatsoever good will and happiness you have expressed for us."

Dr. Kirk said he could add but little to General Rigby's statement with regard to Zanzibar. Respecting the travellers who had gone into the interior, no positive information had been received for some time from either Mr. Stanley or Lieutenant Cameron, but he had no doubt they were advancing safely. Mr. Stanley, when his last letters were despatched, had reached Ugogo, and had gone to the north towards Victoria Lake. Lietenant Cameron, when last he was heard of, had reached, for the second time, the western shore of Tanganyika, whence he would follow up Dr. Livingstone's discoveries in the Manyuema country, and if possible pass down the Congo. From what was known of his character and the admirable way in which he had organised his expedition from Ujiji, and conducted the circumnavigation of the lake, there was very little reason to doubt that he would accomplish his object. The Zanzibar mail had that day arrived, but no mention was made of the explorers in his Highness's letters, and his Highness therefore concluded that all was going well with them.

Dr. Badger said that his Highness desired him to say that all he had heard about Lieutenant Cameron went to show that he was received everywhere with great kindness by the people, and was making his way famously. Those who should hereafter be sent out by the Royal Geographical Society for the exploration of Eastern Africa would always receive his Highness's best assistance, for his wish was to consider England and his own dominions in Africa as one and the same country.

After a few words respecting the domestication of the elephant in Africa, the Sultan and his suite retired.

Dr. Carpenter then read a paper on recent observations on ocean temperatures, made in H.M.S. 'Challenger,' and U.S.S. 'Tuscarora,' with their bearing on the doctrine of a general oceanic circulation.

Dr. Carpenter said the data afforded by the deep-sea temperature reports sent home by the 'Challenger,' and those taken by the 'Tuscarora' in the North Pacific, afforded much interest in their bearing upon the doctrine of a general oceanic circulation, a theory which he had before had the honour of bringing before the

Royal Geographical Society. The *rationale* of this theory would probably be further tested by the researches of the 'Challenger' in the North and South Pacific Oceans.

On leaving the Cape of Good Hope, the 'Challenger' proceeded in a zig-zag and pretty nearly S.E. direction to Kerguelen Land. The first serial sounding taken soon after leaving Cape Town, showed in a very marked degree the influence of the Agulhas Current, which may be considered as an extension of the Equatorial Current of the Indian Ocean, slanted to the S.W. by the coast-line of South Africa. The current was setting W.S.W., and its surface-layer temperature was 73°, an excess which was found to continue during a run of 230 miles to the S.S.E., and then suddenly disappear.

January was spent in an examination of Kerguelen Land and Heard Island, with a view to ascertain their suitableness for Transit Observation stations. The climate of Kerguelen Land at the midsummer of the southern hemisphere, proved to be very like that of England in winter, but it seldom freezes at the level of the sea even in winter. Heard Island to the south-east of Kerguelen's Land, near the parallel of 53° S., consists of two enormous glaciers, the spurs of which even in summer extend down to the beach on both sides of the island. The temperature during the stay of the party ranged between 39° and 36°, which is the same as the temperature of the surface-water, and therefore a correct indication of the mean for the time of year.

Thus the surface temperature of the Southern Indian Ocean in summer is 18°, or 20° F. below that of the North Atlantic under the same parallels; but there is not by any means the same difference in winter, the southern isotherm of 41° F. shifting only about three degrees of latitude nearer to the equator, while the corresponding northern isotherm moves at least ten degrees to the south. On the other hand, the surface-temperature of the Southern Indian Ocean seems to correspond very closely, alike in summer and winter, with that of the South Atlantic under the same parallels. Dr. Carpenter then drew attention to certain circumstances which proved that the current, attracted by the Arctic indraught, narrows and deepens the bulk of its waters as it moves northward, while the corresponding stratum to which the Antarctic indraught imparts motion, from the Tropic of Capricorn towards the South Pole, will be continually widening out as it flows, and will therefore be constantly *diminishing* in thickness. Now, as the surface-temperature in high latitudes is far more influenced by the thickness of a moderately warm sub-surface stratum, than by any elevation in the temperature of a thin surface layer, which is liable to speedy reduction under the influence of a low atmospheric temperature, it is probable that the low temperature of the Southern Indian and South Atlantic Oceans, with the consequent depressing influence on the climate of the small islands scattered throughout those oceans, and on the position of the Antarctic ice-barrier, is mainly due to the lateral extension, and consequent thinning-out of the Poleward upper-flow; while the relatively high temperature of the North Atlantic under the same parallels, with the amelioration it produces in the climate of the British Islands, the Faroes, the coast of Norway, &c., would appear to be mainly attributable to the lateral compression, and consequent increase in depth, of the Poleward upperflow, which further carries with it an excess of temperature imparted by the Gulf Stream to the Mid-Atlantic, in which it loses itself.

From Kerguelen Land, the 'Challenger' proceeded southward, for the purpose of sounding and dredging on the border of the Antarctic ice-barrier. The result of this and other soundings in proximity to the ice showed that the superficial stratum was cooled down, by the melting of ice, to several degrees below the subjacent stratum on which it floated, in virtue of its reduced salinity. As there is no question of any "Gulf Stream" in the Antarctic area, Dr. Carpenter ventured to think that the presence of this warm underlying stratum affords conclusive evidence of a general Poleward movement of the upper stratum of oceanic water.

The soundings subsequently taken by the 'Challenger' in different parts of the Eastern Archipelago confirm, in a most remarkable measure, the theory that when a deep basin or depression of water is shut out from the surrounding ocean by a ridge, the temperature of water in the basin corresponds with that of the outer ocean till one reaches the level of the ridge, and that then no alteration takes place till the bottom of the basin is reached. This was further confirmed by some remarkable soundings taken off the north coast of New Guinea. Here depths of 4475 and 4579 fathoms were proved, and the only one of the four thermometers sent down which withstood the tremendous pressure of nearly six tons on the square inch, recorded a bottom temperature of 34°.5 F. As this temperature was also recorded at a depth of 1500 fathoms, there was here a stratum of 3000 fathoms in thickness, having a uniform temperature of 34°.5, which is obviously the temperature of the coldest water that can find its way into this extraordinary depression. Thus it appears that the temperature of any sea-bottom will depend upon the depth at which its area communicates with some other, into which the glacial underflow streams without interruption from one of the Polar basins.

The 'Tuscarora' was sent out by the United States Government, not with a view to scientific research, but for the purpose of determining by deep-sea sounding the most practicable route for a submarine cable between the Pacific sea-board of the United States and Japan. In addition to ordinary bathymetrical determinations, bottom-temperatures were everywhere taken with "protected" thermometers; and the thermal stratification down to about 600 fathoms was also systematically determined by serial soundings. A very important body of facts has been thus collected in regard to the thermal condition of the North Pacific along the two lines examined;—viz., the Southern route, passing directly across between the parallels of 20° and 30° N. latitude, from San Diego in California, by way of the Sandwich Islands, to the Bonin Islands, and thence northward to Yokohama; whilst the Northern route followed a great circle-course from Yokohama along the line of the Kurile and Aleutian Islands to Cape Flattery, the northernmost point of the United States territory. The observations taken along the northern line appear to point out that in the North Pacific there is the general want of that sub-surface stratum of above 40° F., which in the North Atlantic under the same or yet higher parallels has a thickness of at least 500 fathoms. The true cause of this peculiarity is that the North Pacific derives its deep stratum of glacial water, which nearly fills its basin, from the Polar area of the opposite hemisphere, the inlet at Behring's Straits being too narrow and too shallow to admit a flow of water of any appreciable importance. This northward flow of water from the Equator must have as its complement a movement of the superficial stratum from the northernmost limit of this flow *towards* the Equator, and thence towards the Southern Pole. The glacial current when it reaches the North Pacific comes nearer the surface than it does in the Southern Ocean, even in higher latitudes, and this, modifying still further the reflux surface flow towards the Equator, would appear to account for the well-known moderation of the Sandwich Islands climate, though they lie within the tropic of Cancer.

As regards the eight soundings run off and on the American shore between 48° 20' N. and 37° 40' N., the sections obtained correspond with those taken along the western shore of the European continent, showing that within a small distance from the present shore-line there is a very rapid descent of the bottom, the oceanic basin soon showing a depth that approaches 2000 fathoms, with steep sides. The Sandwich Islands themselves rise abruptly from a vast depression in the North Pacific

Ocean. From a consideration of the bottom brought up the by the soundings, a great portion of which was coral, it appears very probable that the vast area between the Sandwich Islands and Japan has been one of great and rapid subsidence within a very recent epoch, for it is impossible to account for the uniform presence of coral, unless we admit that each of the elevations had been—if not above the surface—sufficiently near to it to allow the reef-building corals to live, the normal limit of their depth being fixed by Darwin and Dana at about 20 fathoms.

Along the northern route, commencing from Yokohama and proceeding N.E., the 'Tuscarora' made three ventures to select a favourable line for laying a cable. Each renewed attempt was made nearer land, but in spite of this the depth proved too great and too irregular to be suited for a telegraph cable. She then sailed into Behring's Sea and proceeded along the northern shores of the Aleutians, emerging into the Pacific through Ounimak Straits to the south of the Alaskan Peninsula, where a depth of 3664 fathoms was sounded; but from this the bottom rapidly rose, as the vessel sailed along a great circle course towards Vancouver's Island. A sudden elevation (apparently a continuation of the ridge which forms Queen Charlotte's Island) then presents itself; within this the bottom again deepens to more than 1300 fathoms, and then rapidly rises as in the other sections taken along the North American coast.

The PRESIDENT said that it was upon such papers as that which Dr. Carpenter had prepared that the scientific reputation of the Royal Geographical Society amongst Continental nations depended. If it was merely a society to register personal adventures, or the ordinary run of travellers, it might be a Geographical Society, but it would not be a scientific Geographical Society. When, however, serious problems of physical geography, such as Dr. Carpenter had solved, were considered, the Society fulfilled those functions for which it was really constituted.

FRENCH GEOGRAPHICAL SOCIETY.—*Meeting of 2nd of June*, 1875.—M. Delesse in the chair. A letter from the Abbé Desgodins was read, dated Bathang, in Tibet, the 15th of January, 1875, and containing geological and meteorological observations made in his journeys between Yerkalo and Bathang.

The Abbé Bouché communicated some notes on the slave coast, from which it appears that Atakpame is the most important town of the different states between Dahomey and the Volta. The town is surrounded by dense forests, and has further defences in the shape of mountains, which hem it in on every side. The inhabitants are pretty skilful in the use of the bow and musket, and enjoy a reputation for being good hunters. The natives of Ahgwey, Great Popo and Little Popo, often repair to Atakapame to dispose of salt, flints, gunpowder, and other commodities; ivory forms the chief export, and this is usually tendered in exchange for gold, which the inhabitants make up into ornaments. There are no towns of importance between Atakapame and the sea; on the coast is Little Popo, a town upwards of 200 years old, and to the north-east of it there is a settlement called Ajido, belonging to the Souza family, which claims direct descent from the Portuguese negro Antonio Felix de Souza, who was the father of 345 children. Ataunde, the governor of Ahgwey, has been in power since the beginning of 1874: he is an agreeable, intelligent, and energetic official, with clear notions of common sense and justice. The population of Ahgwey consists of from 5000 to 6000 souls, of which about two-thirds are foreigners. The coast lands are sandy and unproductive, but north of the Lagoon the country is fertile. Ahgwey can never attain much importance, as there are no means of easy communication with the interior, and in a country where camels and oxen are unknown as beasts of burden, and horses are very rare, and where all goods are carried on the head, this is a fatal obstruction to commercial development. The negro policy, too, of creating a monopoly of trade for the coast acts injuriously against attempts to open up the country.

An account was then given of M. Raffray's recent explorations in Abyssinia and the East Coast of Africa. This gentleman left Toulon on the 20th of July, 1873, and being entrusted with a scientific mission by the minister of public instruction, repaired to Massowah, with the object of making zoological researches along the coast-lands. He set out inland from Massowah on the 13th of August, and soon reached Asmara on the African table-land, from whence he made his way along the caravan route to Adowa, the capital of Tigre. On the 20th of October he left this town for the south, passing those curious bluff, terraced mountains called Ambas, on the summit of one of which Ras-Golassieh is said to be held prisoner, by his former rival Ras-Kassa, who rules over the country. After traversing mountains of basaltic formation, M. Raffray arrived at Sokota.

From Sokota numerous caravans journey into the Gallas country, and convey thither the lumps of salt which pass for currency in these parts. The church of Ugwere near Sokota deserves notice, being cut out of a single block of granite, in the side of a mountain. After leaving Sokota, M. Raffray descended by the Bambur Valley to the banks of the Takazze River, a stream abounding in crocodiles. After crossing the river into Begemeder the aspect of the country changed from rugged ravines and valleys, with perpendicular sides, to wide valleys and undulating ground. He soon came up with the King Johannes at Gelandios, and was hospitably received by the monarch, who was on his way to punish Ras-Adal, the rebel governor of Godjam. In company with the king and his army, M. Raffray crossed the Blue Nile, which was there upwards of 200 yards wide, and swarmed with hippopotami and crocodiles. At Mota he left the king, and after being obligingly provided by his majesty with an escort, travelled northward past Lake Tsana towards Gondar. On his return towards the coast he encountered some fanatical natives, who assaulted him with stones, and compelled him to take refuge in a church. After four days' durance, he managed to make his escape and bore away to the north-east, as the country to the west was in the hands of a rebel. He eventually arrived at Axum, a town tolerably celebrated for its obelisks and ruins, and thence journeyed to Hebo, where some French missionaries received him with great kindness. On the 3rd of April he arrived at Massowah.

M. Raffray then visited the Dhalak Islands, noted for their pearl fisheries, and made his way to Zanzibar by way of Aden. He explored a portion of the interior of the island of Zanzibar, visited Bagamoyo and Mombasa, and ascended the Chimba Mountains, a chain running nearly parallel with the coast. To the north it takes the name of Gerima; the country is there called Uanika, and inhabited by a tribe of Gallas. Habitations are very few and far between; the huts, which are not high enough for one to stand upright in, are made of palm branches and leaves; in them the men pass a life of great indolence, smoking and drinking a species of palm-wine to excess, and leaving the duties of the household and cultivation of the fields to the women. These wear cotton cloths round their waist, copper rings and bracelets on the wrists and ankles, and a heavy necklace of pearls. The men shave the crown of the head, the women do not do so, though they trim theirs very short. Their arms consist of a batch of poisoned arrows in a leathern quiver, a broadsword and a small club. They have no religion, though they believe in sorcery, and even accused M. Raffray of being the cause of a drought which occurred during his stay there. Although suffering acutely from a wound in his leg caused by a poisonous thorn, he was forced to leave, and after fifteen hours' painful travel arrived at Mombasa. After visiting Pemba, he eventually returned to Paris, after twenty-one months' travelling, with a rich harvest of collections.

PARIS COMMISSION OF COMMERCIAL GEOGRAPHY.—*28th May*, 1875, M. E. Cortambert in the chair. M. Challot, French Consul at Syra, in Greece, exhibited a chart showing the submarine cables which unite the Levant with Western Europe and the rest of the world. He also made a useful suggestion that the Foreign Department should endeavour to afford all the assistance in its power to the Commission, by rendering its archives available for reference as far as possible. M. Moll-Schnitzler, Vice-Consul at Dordrecht, presented a set of statistical maps of the Netherlands, and made the welcome announcement that the second Chamber had unanimously voted the abolition of lighthouse and port dues, a measure which when ratified, will be one of the most important events in the commercial annals of the country.

M. Schædelin, a general officer in the service of China, made certain proposals for the formation of a Franco-Chinese company for coast and river steam navigation in China and Tong-kin. The vessels would be commanded by Frenchmen, but would sail under Chinese colours, which would enable them to visit every port. M. Renard received instructions to report on the feasibility of the project.

26th June, 1875.—M. Murand in the chair. A delegate from the United States to the Geographical Congress was introduced, and expressed regret on behalf of United States and Canada merchants that France should procure her cotton manufactures from England, as this necessitated the payment of two commissions, one to the New York house who sell the raw, and the other to the Manchester or Liverpool house. France would do infinitely better to get her manufactures direct.

M. Moxondo, Brazilian consul at Turin, drew attention to the desirability of emigration to Brazil. M. Miguel Tejera defended the Venezuelan Government against attacks upon it in regard to immigration thereto which had been made in a former number of the *Explorateur*. The immigrants into Venezuela are offered the opportunity of enjoying all the rights of citizens, and the increasing numbers of immigrants clearly prove that these advantages are appreciated. Of course, some black sheep had been sent over, and these refused or were unable to work, and so became burthens on the State. M. Farranc said that might or might not be the case; anyhow the French Government had forbidden emigration thither. M. Hertz remarked that the reports on which the attacks on Venezuela Government were based, were of old date, and it might be safely assumed, in the absence of contrary proof, that she had improved in the same ratio as other countries.

A letter was read from Dr. Penot giving some details of interest respecting a high commercial school in Lyons, the object of which is to ingraft a thorough commercial training to pupils who have already received a good elementary education, making them fitted to occupy responsible posts in merchants' houses in different countries.

M. Babinet enquired if this school resembled in any respects the English commercial travellers' schools, where a purely geographical training is given to boys to fit them when grown up for travelling for mercantile houses in foreign countries (!). M. Renaud replied that exceptional importance was not attached to geography in the French schools.

BERLIN GEOGRAPHICAL SOCIETY.—*Meeting of 2nd of June*, 1875.—Baron Richthofen, President, in the chair. Dr. G. Nachtigall read a paper on his explorations in Africa, which have already been fully reported upon in the pages of the *Geographical Magazine*. The meeting was numerously attended, and the reception of the celebrated traveller was of the most enthusiastic description. Dr. Nachtigall is about 41 years of age, and appears to have suffered but little from the hardships through which he passed in the course of nearly six years' wanderings. The hair of his head and beard are still black, without a tinge of gray, his eyes are dark and piercing, his nose aquiline, and his moustaches of martial dimensions. His stature is small, and he is slimly made, but muscular, his voice is soft and almost monotonous, and he speaks of his achievements with remarkable modesty. The Society has applied to the German Government for a grant, in order that Dr. Nachtigall may be able to elaborate his discoveries and researches at leisure.

VIENNA GEOGRAPHICAL SOCIETY.—*Meeting of 25th May*, 1875.—Dr. F. von Hochstetter in the chair. The President announced the death of Mr. Selleny, the artist of the Novara Expedition, and the award of the Golden Medals of the Royal Geographical Society to Weyprecht and Payer. He then read letters from the Austrian Consul Hansal, describing his journey from Khartum to Lado (Gondokoro) in the company of Mr. Marno, and announcing the speedy return of the latter, who had disagreed with Colonel Gordon. Previously to leaving Lado, Marno and Colonel Long paid a visit to the Makaraka, already known through Dr. G. Schweinfurth. Marno proposes to remain, for the present, at Khartum, and subsequently to start for Dar For.

A letter from Dr. Tietze was then read, describing an excursion to the Sia-kuh, in the salt desert, to the south-east of Teheran. Mr. Julius Payer then read a paper on the effects of the cold during Arctic journeys, and Dr. Breitenlohner described the ice-cave of Kamark, near Leitmeritz.

FRANKFURT GEOGRAPHICAL SOCIETY.—From the annual report of the Verein für Geographie und Statistik at Frankfort-on-the-Main, we learn that that Society now numbers 334 ordinary members, of whom fifteen are ladies. Its receipts during 1874 amounted to 375*l.*, its invested savings to 271*l.* The society contributed 42*l.* towards the expenses of the West African Expedition, nearly the whole of which was raised by voluntary contributions. The expenses included 154*l.* for books and printing, 32*l.* for lectures, and 74*l.* for all other expenses. The library of the society has been united for several years past with the libraries of the Natural History Society, the Senkenberg Medical Institute, the Medical and the Physical Societies, and the entire collection is open to members of any of these societies. Three so-called "scientific meetings" for the reading of papers and their discussion were held during the year, in addition to which seventeen lectures were delivered by Karl Mauch, Dr. Emil Bessels, Dr. Karl Oppel, E. Mohr, and others. The Society has likewise been instrumental in erecting a house on the highest summit of the Taunus Mountains, and supports the efforts of the "Taunus Club," whose task, with respect to the Taunus, is the same as that of the more ambitious Alpine Clubs with reference to the Alps. Herr H. Glogau is President for the current year, Herr K. Pieg, honorary secretary. The annual report, in addition to an ample business statement, contains a *précis* of the meetings, a paper on Southern Russia by B. Pfeiff, and a series of interesting letters from Dr. J. Rein, who is now travelling in Japan. The society has published in addition, two parts of Frankfurt Statistics. Its activity cannot of course compare with that of the societies established in other great European capitals, but is, nevertheless, highly to be commended, as it contributes to the spread of geographical and statistical tastes. In our own provincial towns, but more especially in our colonies, there is scope for a large number of similar societies which would find a useful sphere of activity in the geographical exploration and description of their own immediate neighbourhoods in the preparation and publication of local statistics, the promotion of

geographical instruction in schools, the arrangement of lectures, &c. Very much, in fact, remains to be done at home. Throughout the British Islands an intelligent observer may find much deserving of record, and the production of a series of comprehensive statistical and topographical accounts of our counties would be task worthy of local geographical and statistical societies, whose formation we advocate. Our explorers and tourists now go abroad in search of adventures. We advise them to bestow some of their energies upon their native country, and ask them in the words of Schiller—

Warum in die Ferne schweifen,
Wenn das Schöne liegt so nah?

HAMBURG GEOGRAPHICAL SOCIETY.—*May 13th*, 1875.—Dr. Kirchenpauer, President, in the chair. Mr. Friederichsen announced that £390 had been subscribed by members of the Society in aid of an expedition to Persia about to be undertaken by Dr. Andreas. The region to be explored by this traveller was bounded on the north by the road connecting Bushîr, Shirâz, and Kirmân, and his knowledge of Persian archæology and history qualified him particularly for the work he had undertaken, and promised a rich harvest of scientific results. Dr. G. Neumayer, the director of the German Nautical Observatory (Seewarte), then rendered an account of the scope and objects of this newly created institution. The Seewarte will extend its labours to every subject connected with navigation, ocean geography, and meteorology. It will work out the observations made on board German vessels, prepare sailing directions, afford means for testing and improving nautical instruments, and establish meteorological and signal stations at the principal German ports. Its work will be carried on in accordance with the resolutions of the meteorological conferences held at Leipzig, Vienna, and London. Mr. H. Tetens read a paper on a journey through the state of Magdalena (Columbia) in 1874. Starting from Porto Dibull, a small harbour to the east of Santa Marta, the capital of the state, he travelled about 13 leagues in a southerly direction as far as Macatama, the most important settlement of the Aruanco Indians, at an elevation of 10,000 feet above the sea, and only about 3000 below the crest of the snow-capped Sierra de Santa Marta. He subsequently traced the Rio Tapia for a considerable distance from its mouth. The Goajiros, in Eastern Magdalena, have maintained their independence; they breed cattle and small horses, which they take for sale to Rio de la Hocha. They are tall, have smooth hair, and a chestnut complexion. The Aruancos on the other hand, scarcely exceed 4 ft. 6 inches in height, have a tawny skin, and can scarcely be distinguished from Creoles. They till the soil, and, like all other coast tribes, the Guajiros excepted, they talk Spanish. It is much to be regretted that Herr Tetens was not in a position to make a survey of the country explored by him, for the interior of the state of Magdalena is one of the least known portions of South America. Colonel Codazzi, whose posthumous *Atlas de los estados unidos de Columbia*, is well known to all geographers, unfortunately died before he had extended his valuable surveys to the northern portion of this state.

BORDEAUX SOCIETY OF COMMERCIAL GEOGRAPHY.—This Society, after seven months of existence, numbered on the 11th of June no less than 266 members. At a meeting on the 8th of February, under the presidency of M. Marc-Mamel, a paper was read on the mineral resources of the department of Ariége, a mountainous country with a scanty population, and but few lines of communication. Its mineral resources are, however, considerable, and deserve to be better known; iron, lead, zinc, antimony, copper, manganese, and cobalt, being all found, besides marble, lignite slate, and numerous other stones.

At a subsequent meeting on the 22nd of February, a paper was read by M. Malvezin, on the six different projects for opening communication across Central America between the Atlantic and the Pacific.

EGYPTIAN GEOGRAPHICAL SOCIETY.—This Society owes its origin to the enlightened policy of the Khedive, who charged Dr. G. Schweinfurth with its organization, and appointed him President. The first meeting took place on the 3rd of June, when Dr. Schweinfurth delivered an inaugural address. He was able to announce that communications had already been established with the leading geographical societies of the world, and that the first number of a monthly journal would be published in October or November next.

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ERRATA.

In the article on "Paraguay," in our last number,

Page 201, 2nd col., line 18, *for* their, *read* our.
,, 202, 1st ,, ,, 40, *for* as, *read* by.
,, ,, 2nd ,, ,, 29, *for* grancampos, *read* grass camps.
,, ,, ,, ,, ,, 63, *for* was, *read* has.
,, 203, 1st ,, ,, 60, *for* molance, *read* molasses.

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